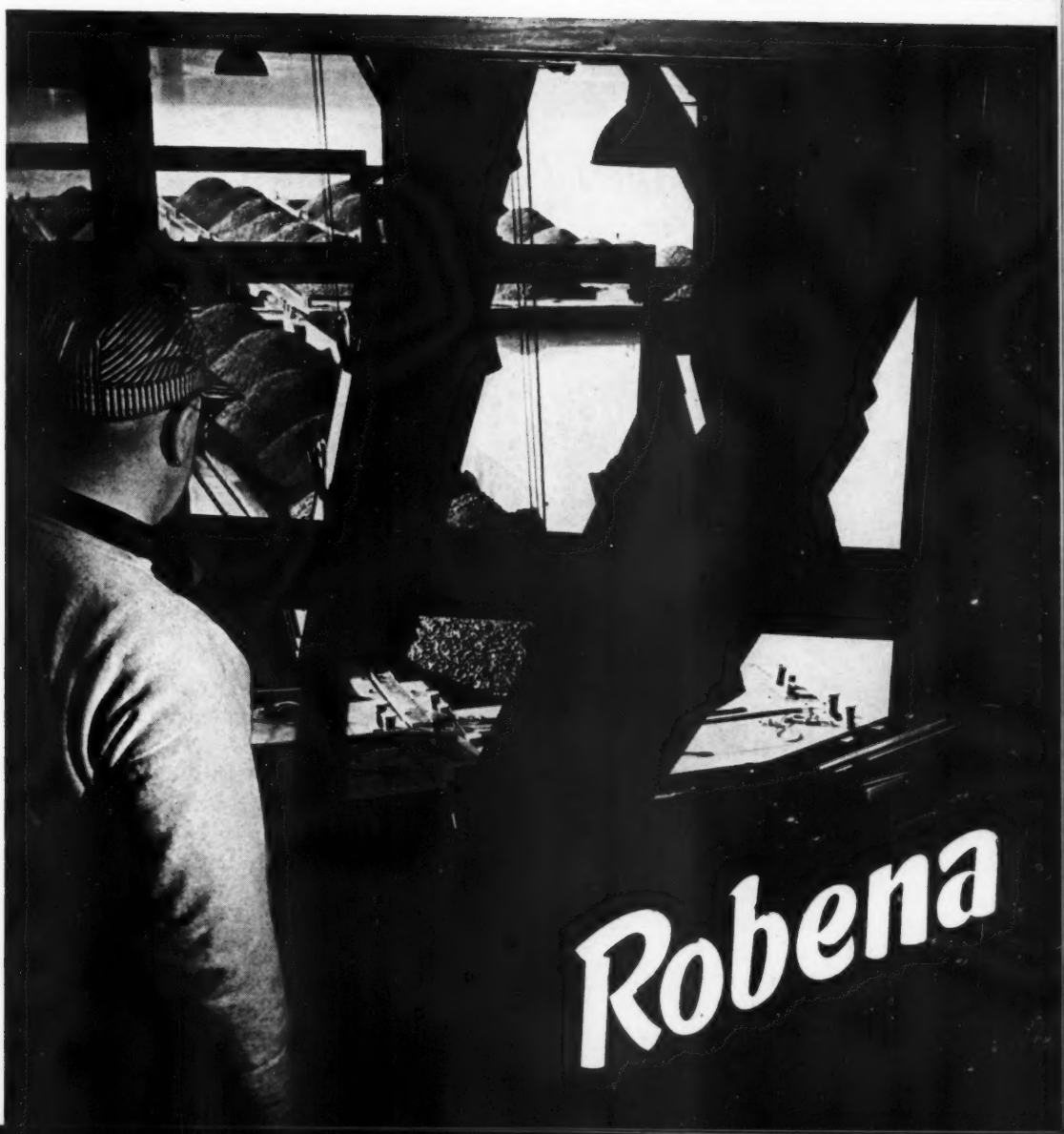
Mining CONGRESS JOURNAL

THE AMERICAN MINING CONGRESS

MARCH
1947

featuring the

WORLD'S
LARGEST
COAL
MINE



A Kennametal *bit that cut*

175

places before it was sharpened

1000

places before wearing out

These are figures taken from performance data collected by a satisfied user of Kennametal cutting machine bits in a Washington County, Pennsylvania coal mine. Comparing Kennametal bits with steel bits cutting coal in the Pittsburgh seam, mine operators found that steel bits cut 4 places before sharpening; Kennametal, 175. A margin of 171 places with Kennametal under conditions that were identical. A thousand places were cut before the bits wore out, about 16,000 tons of coal mined. And the bit cost figured only .4 of one cent per ton.

This mine used the new bits on a Jeffrey 35BB cutting machine having a 9′ bar, and 9′ by 12′ places were cut at the rate of 13 minutes per place. When steel was used it took 18 minutes per place, and the cutting machine consumed 25 to 33% more power. Moreover, enough time was saved in an eight-hour shift to pay for all the 42 Kennametal bits in the cutter bar chain. Such facts as these help to explain why more and more coal mines use Kennametal bits every day. And why they may be able to help you bring about more economical coal cutting.

If you would like a demonstration, our representative in your district will be glad to contact you. Simply write—Mining Division, Kennametal Inc., Latrobe, Pa., giving your name and address. As prompt delivery can be made, we suggest you write today!

KENNAMETAL

SUPERIOR CEMENTED CARBIDES

KENNAMETAL *Inc.*, LATROBE, PA.

for Mineral Prospecting and Test Borings

CP Gasoline-Driven Diamond Core Drill

Specifically designed for drilling and piping jobs where the "going is tough," the ruggedly built CP No. 8 gasoline driven DIAMOND CORE DRILL has a capacity of 900 feet with E-EX Fittings.

It meets every requirement for making test borings, for mineral prospecting from the surface, and for shallow oil structure drilling in all formations.

Skid-mounted, on a substantial steel frame, the drill is readily moved from hole to hole under its own power.

When drilling at the continuous high speeds made possible by bortz bits, it gives maximum performance with low maintenance.

Write for complete specifications.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 6 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

"...and keep your powder dry"

AMERICAN CYANAMID COMPANY

With the level of industrial activity so largely determined by the supply of base metals, even a small reduction in tailings values can be doubly important today: In making more vitally-needed metal available, and, in offsetting sharply increased mining and milling costs.

At present rate of mill feeds and operating costs, any 1946 flow scheme or reagent combination warrants critical re-examination.

Without interrupting the flow of ore through your mill, Cyanamid Field Engineers may be able to render constructive help by spot studies of ways and means to readjust reagent combinations. New Cyanamid Reagents and processes, or, new applications of older Cyanamid Reagents may prove well worthwhile.

And—when and if you plan a new mill, expansion or modification of present equipment, the Cyanamid Mineral Dressing Laboratory can bring you an unduplicated reservoir of creative research, personnel and facilities for the microscopal, chemical and physical testing of your ore and the development of the flow scheme for its most economic treatment.

Heavy-Media Separation may prove helpful in upgrading your present mill feed and thereby increasing the output of concentrates, or, in inexpensively preconcentrating ore heretofore considered too low-grade for profitable treatment. Cyanamid is prepared to run tests under conditions duplicating actual mill operation. The Heavy-Media Separation plant in the Cyanamid Mineral Dressing Laboratory has commercial-size equipment capable of handling samples in carload lots.

Always motivated by the simple principle "he profits most who serves best", Cyanamid is today more alert than ever to help you cope with the challenge and the opportunity of today's changing metallurgical economics.

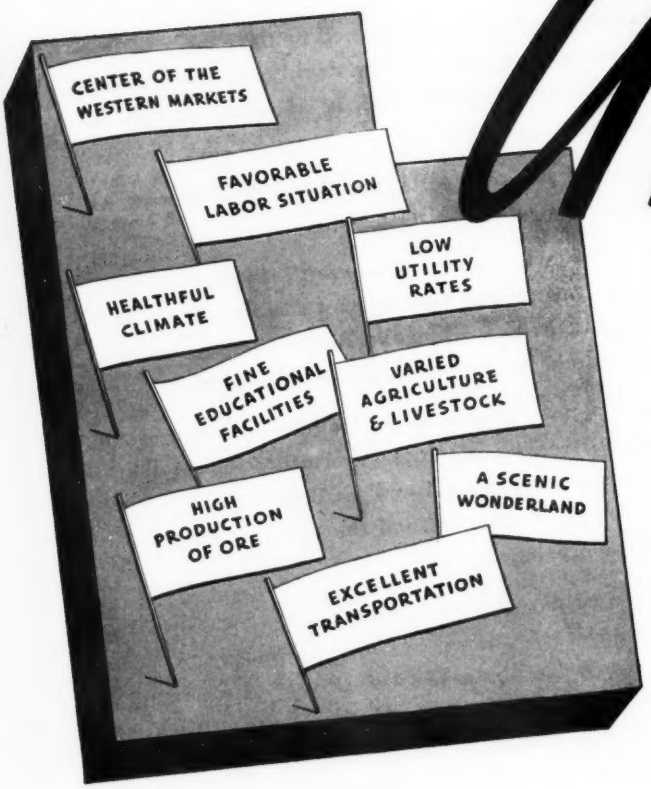
AMERICAN CYANAMID COMPANY PRODUCTS

30 Rockefeller Plaza, New York 20, N. Y.

UNION PACIFIC

TREASURE MAP OF INDUSTRY

Utah *



Herbert B. Maw, Governor of Utah, tells his state's story.

"Nature was kind to Utah. Deposited within her borders are rich and varied sources of coal and iron, lead and zinc, copper, silver and gold. These and many other industrial attributes are part and parcel of the undeveloped sections of this state.

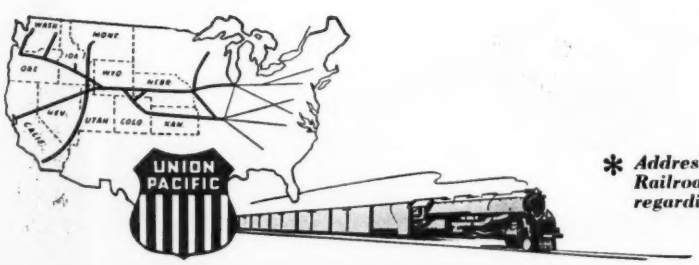
"A gigantic steel industry which can serve the west signals our industrial ambition. It will form the nucleus of a network of associated industries.

"Our need now is people and leadership to share in the prosperity of a western empire. Our natural resources are practically untouched. They assure a long life to an industrial future which is just now beginning. Utah invites new and expanding industry to investigate opportunities here before deciding upon new locations."

★ ★ ★

For industrial resources and opportunities, look to Utah. For unexcelled rail transportation . . .

* *One of a series of advertisements based on industrial opportunities in the states served by the Union Pacific Railroad.*



be Specific – say "Union Pacific"

* *Address Industrial Department, Union Pacific Railroad, Omaha 2, Nebraska, for information regarding industrial sites.*

UNION PACIFIC RAILROAD

THE STRATEGIC MIDDLE ROUTE

Mining CONGRESS JOURNAL

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(*Los Angeles and San Francisco*)

★ ★ ★

FRONT COVER: Central barge loading station at the Robena River Tipple has all controls at the operator's finger tips.

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Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress

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THE AMERICAN MINING CONGRESS
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HOWARD I. YOUNG, *President* DONALD A. CALLAHAN, *Vice President* LOUIS S. CATES, *Vice President* JAMES D. FRANCIS, *Vice President* JULIAN D. CONOVER, *Secretary*

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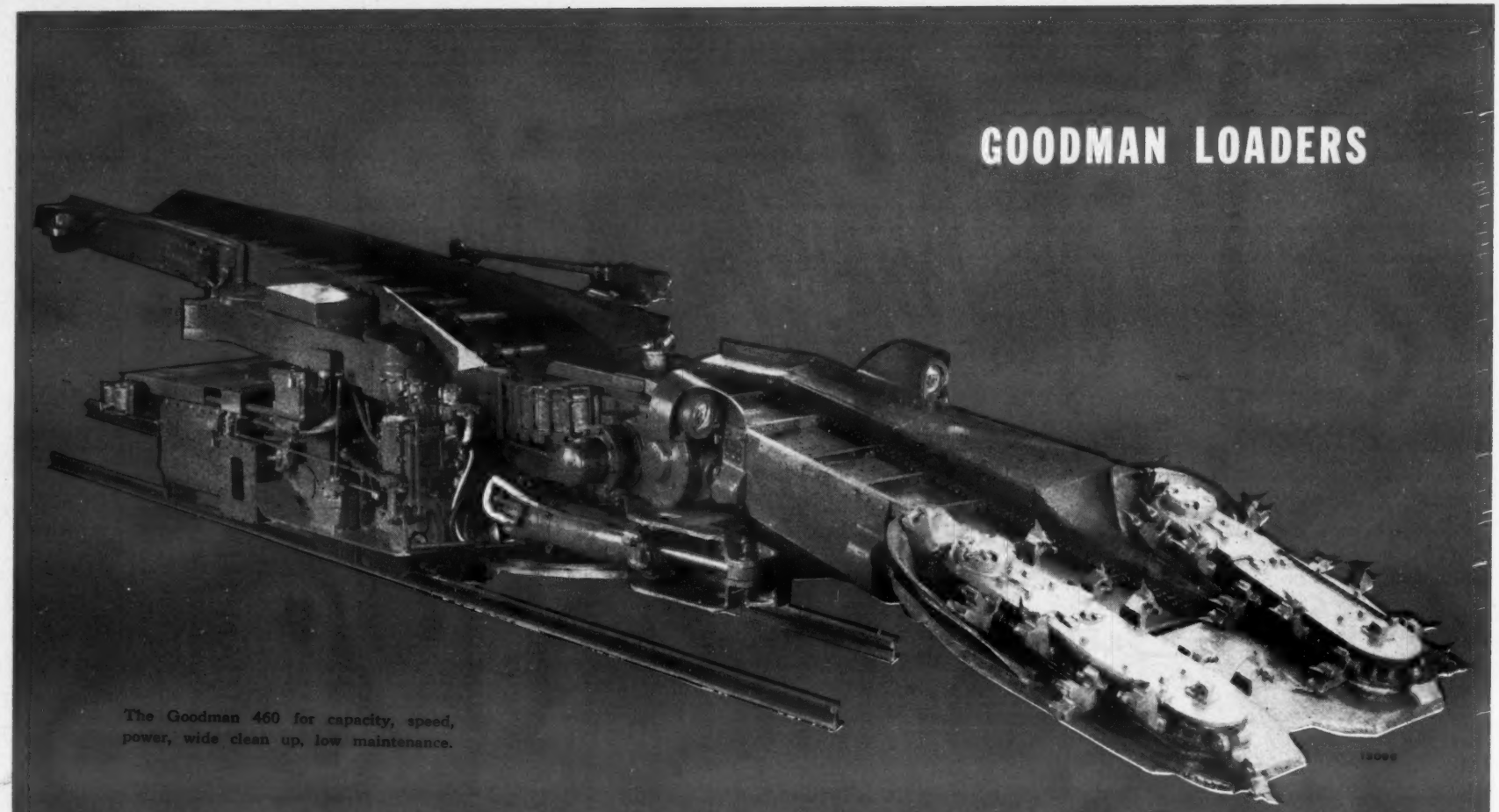
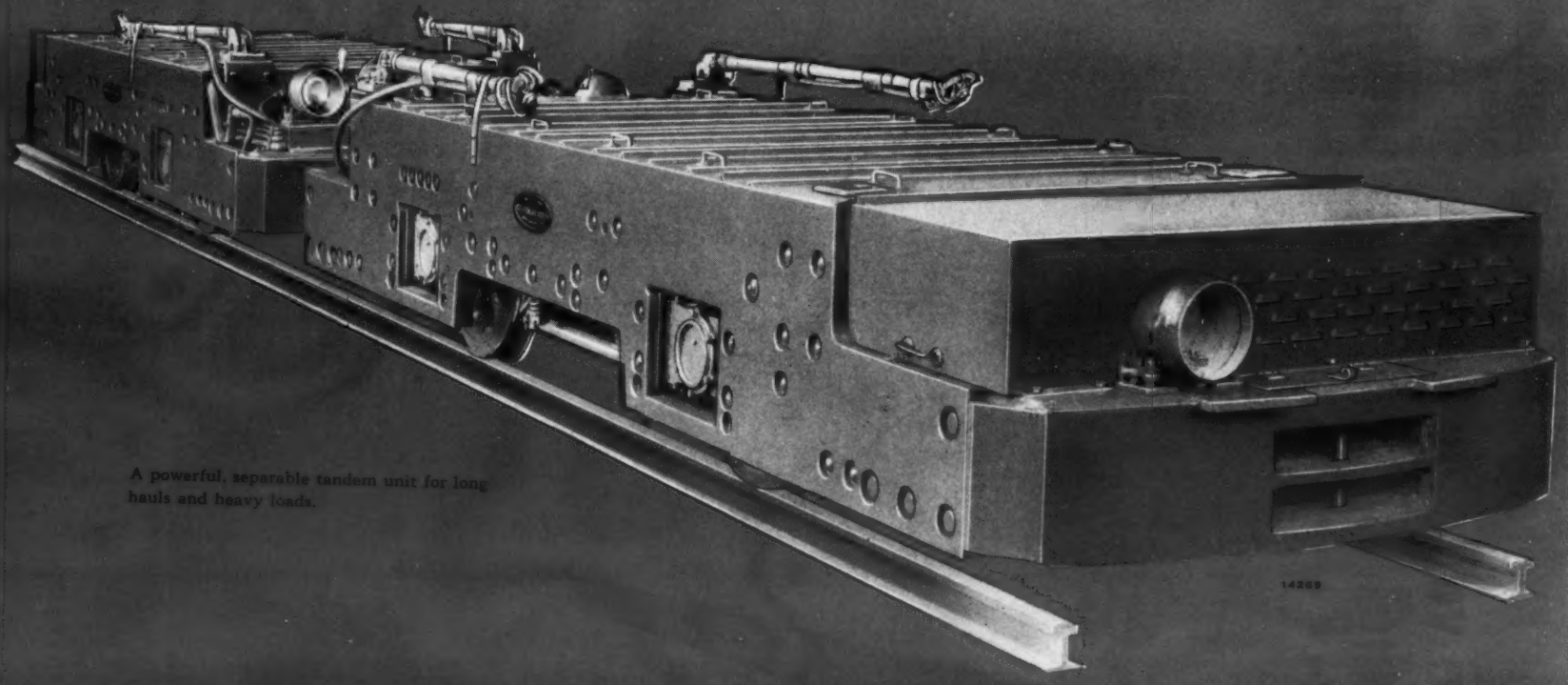
ABC

GOODMAN LOADERS



The Goodman 460 for capacity, speed, power, wide clean up, low maintenance.

GOODMAN LOCOMOTIVES



A powerful, separable tandem unit for long hauls and heavy loads.

GOODMAN MANUFACTURING COMPANY • HALSTED STREET AT 48TH • CHICAGO 9, ILLINOIS

actual Motor Service Records prove value of National Special Heat-Resistant Coils

MOTOR SERVICE RECORD

Application: HOIST MOTOR

Location: CUPOLA CRANE

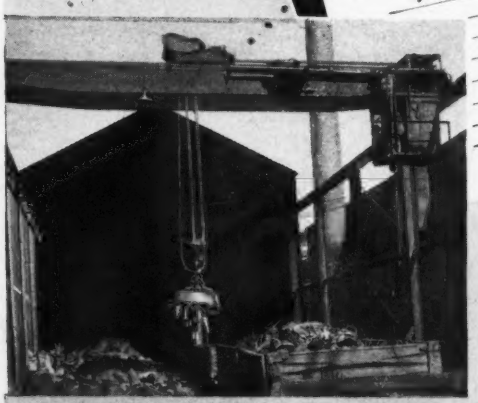
Rating

HP: 15
Amperage: 52
Frame: 30
Style No.: 123456

Speed: 600
Winding: SERIES
Type: MILL + CRANE
Serial: 246102

Voltage: 250
Bearing: SLEEVE
Temp Rating: ½ hp 75°C

Date	Reason for Change	Length of Service	Type of Coils Armature & Field
6-30-42	ARMATURE BURNED OUT	22 DAYS	CLASS B-MICA + GLASS
7-22-42	" " "	9 "	" " "
7-31-42	" " "	36 "	" " "
9-5-42	" " "	48 "	" " "
10-23-42	" " "	77 "	" " "
1-8-43	" " "	68 "	" " "
3-17-43	" " "	22 "	" " "
4-8-43	" " "	80 "	" " "
6-27-43	" " "	78 "	" " "
9-13-43	" " "	65 "	" " "
11-17-43	" " "	83 "	" " "
2-8-44	" " "	27 "	" " "
3-6-44	" " "	46 "	" " "
4-21-44	" " "	60 "	" " "
6-20-44	" " "	49 "	" " "
8-8-44	" " "	64 "	" " "
10-11-44	" " "	55 "	" " "
12-5-44	" " "	29 "	" " "
1-3-45	" " "	64 "	" " "
3-8-45	" " "	59 "	" " "
5-6-45	" " "	19 "	SILICONE, MICA + GLASS
5-25-45	" " "	38 "	" " "
7-2-45	" " "	312 "	" " "
5-10-46	BEARING FAILURE	(323 days elapsed)	
4-1-47	(Still Operating)		



The above reproduction of a typical Motor Service Record Card, from a large steel mill, shows an average life of 50 days of conventional Class B windings in a cupola crane hoist motor. It shows only a bearing failure for the 635 days of identical service which have elapsed since National-designed silicone coils were installed. (The armature winding only, injured as a result of the bearing failure after 312 days of service, was replaced, although it could have been repaired.)

The motor was amply rated for intermittent operation, but production demands forced practically continuous operation; operating temperature exceeded Class B limits; failure after failure resulted. Hoist design limitations made installation of a larger motor impossible, and short-lived coils seemed inevitable to the mill operators *until National-designed silicone windings were tried*

If high heat shortens the life of coils in your motor or other rotating electrical machine, National can help decisively. Silicone, mica, melamine, glass—all are valuable, but they must be properly used. And all organic materials must be discarded. Very often, heat dissipation can be improved. Whatever factors are essential to fight heat damage, National engineers know them; they know how to combine them; they know how to apply them to your heat-damage problem.

NATIONAL ELECTRIC COIL COMPANY

COLUMBUS 16, OHIO, U. S. A.

ELECTRICAL ENGINEERS' MAKERS OF ELECTRICAL COILS AND INSULATION — REDESIGNING AND REPAIRING OF ROTATING ELECTRICAL MACHINES

UNITED STATES RUBBER COMPANY

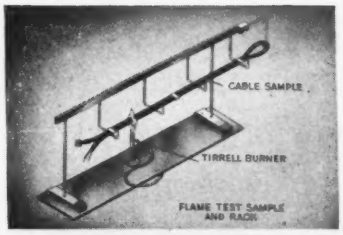
SERVING THROUGH SCIENCE

FLAME RETARDANT

U. S. Royal Cables are called "Flame Retardant" only after they've passed the severe "Flame Test." That's to make sure they conform to strict fire prevention laws. The Department of Mines of the Commonwealth of Pennsylvania, for example, assigns U. S. Royals the number "P-103" to indicate conformity with the Department's high fire-safety standards.

U. S. Rubber Company scientists, in their "Safety-Testing" program, also put U. S. Royal Cables through ordeals of bending, twisting, impact, stretching and moisture absorption.

UNITED STATES RUBBER COMPANY
1230 Avenue of the Americas • Rockefeller Center • New York 20, N. Y.



THIS IS THE FLAME TEST:

400% overload current is applied to conductors until cable sheath is heated to 350° F. Inner cone tip of Tirrell burner flame then applied for 1 minute to bottom surface of folded cable. Total length charred is measure of flame-retardance and shall not exceed 14 in. U. S. Royal Mining Cables pass test with extra margin of safety.

THE NEW U. S. ROYAL *Safety Tested*

MINING MACHINE AND LOCOMOTIVE CABLES

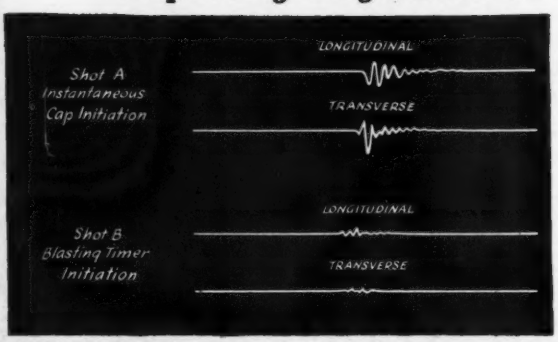
ANNOUNCING...

DU PONT BLASTING TIMER

Another Development of Du Pont Explosives Research and Technical Service

A SAFER
AND MORE EFFICIENT METHOD OF—

•Reducing Vibration
•Improving Fragmentation



SEISMOGRAPH RECORDS—Typical of similar blasts made (A) with, (B) without, the Blasting Timer.

THE Du Pont Blasting Timer introduces a new and improved method of providing short period delay blasting. Designed primarily for stripping and quarry operations, it embodies greater flexibility—permits broader application than any other known means.

It offers a wide choice of delay intervals—all precisely controlled—ranging from .010 second to .040 second—and *four* to *seven* circuits (periods) at each interval.

High degree of selectivity to suit individual blasting conditions allows continued use of Primacord initiated *above ground* by attaching instantaneous electric caps which are fired in proper sequences by the Timer. Power is applied with a conventional switch located at a safe distance.

Results: Greater reduction in vibration than is possible by any other method—usually accompanied by marked improvement in fragmentation—less back break in multiple row blasts.

Ask your Du Pont Explosives Representative for complete information, or write—E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

DU PONT BLASTING TIMER

A Product of Du Pont Explosives Research

DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING

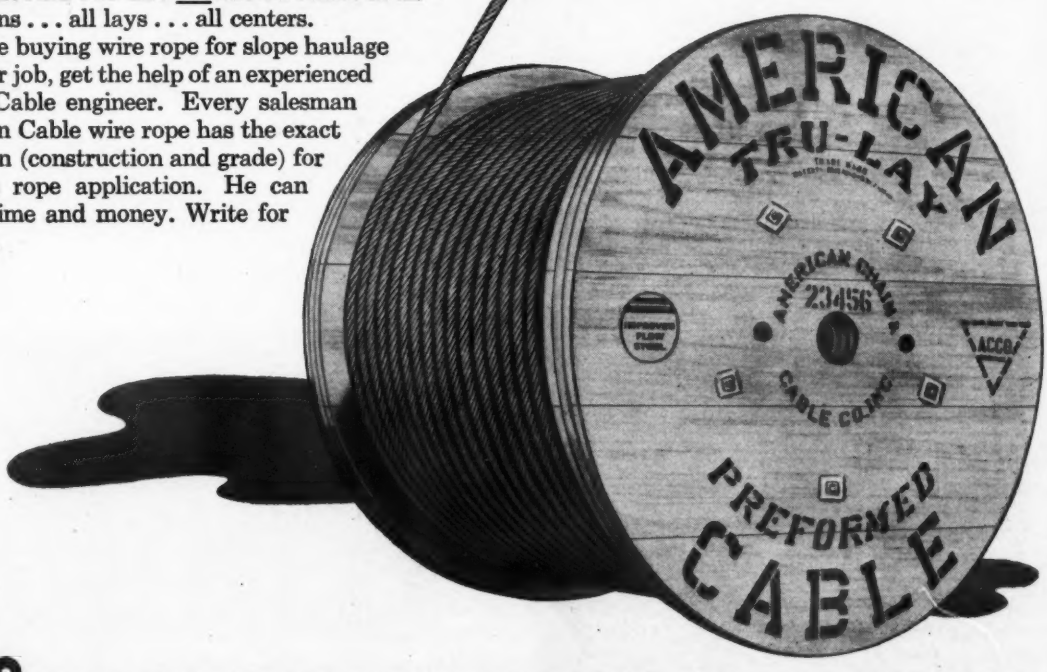
TRU-LAY Preformed for SLOPE HAULAGE

Slope haulage wire ropes whip, jerk and skid across rails, ties and the ground. Yet it is in just such service that TRU-LAY Preformed proves its ability to take punishment.

The ideal wire rope for slope haulage is TRU-LAY Preformed Improved Plow Steel. It gives better and longer service. It represents the proper combination of strength and toughness for the most grueling jobs. With this combination go long experienced engineering and thorough step-by-step inspections. And TRU-LAY Preformed comes in all constructions . . . all lays . . . all centers.

If you are buying wire rope for slope haulage or any other job, get the help of an experienced American Cable engineer. Every salesman of American Cable wire rope has the exact specification (construction and grade) for every wire rope application. He can save you time and money. Write for him today.

- **LASTS LONGER**
- **HANDLES EASIER**
- **LESS LIKELY TO KINK**
- **SPOOLS BETTER ON DRUM**



ACCO Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Emlenton, Pa., Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Tacoma, Seattle, Bridgeport, Conn.

AMERICAN CABLE DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

In Business for Your Safety

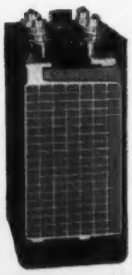
Power with a push!

Extra large plates in Gould Kathanode Batteries produce more power.

It takes powerful men to make shot-put records. It takes powerful batteries to keep shuttle cars running on schedule. That is why Gould Kathanode has been designed so extra power is packed into each cell.

and here is the Reason why—

The spun glass mats and unit-seal envelopes that make up the well known Gould Kathanode unit hold all useful active material in place. Shedding is minimized. Sediment chambers are smaller. Plates are larger. The result is more battery in the same space.



Gould Kathanode Batteries maintain full capacity and have extra power for emergencies. Get the facts. Write Dept. 133 for Catalog 300 on Gould Kathanode Glassklad Batteries for Mine Shuttle Car Service.

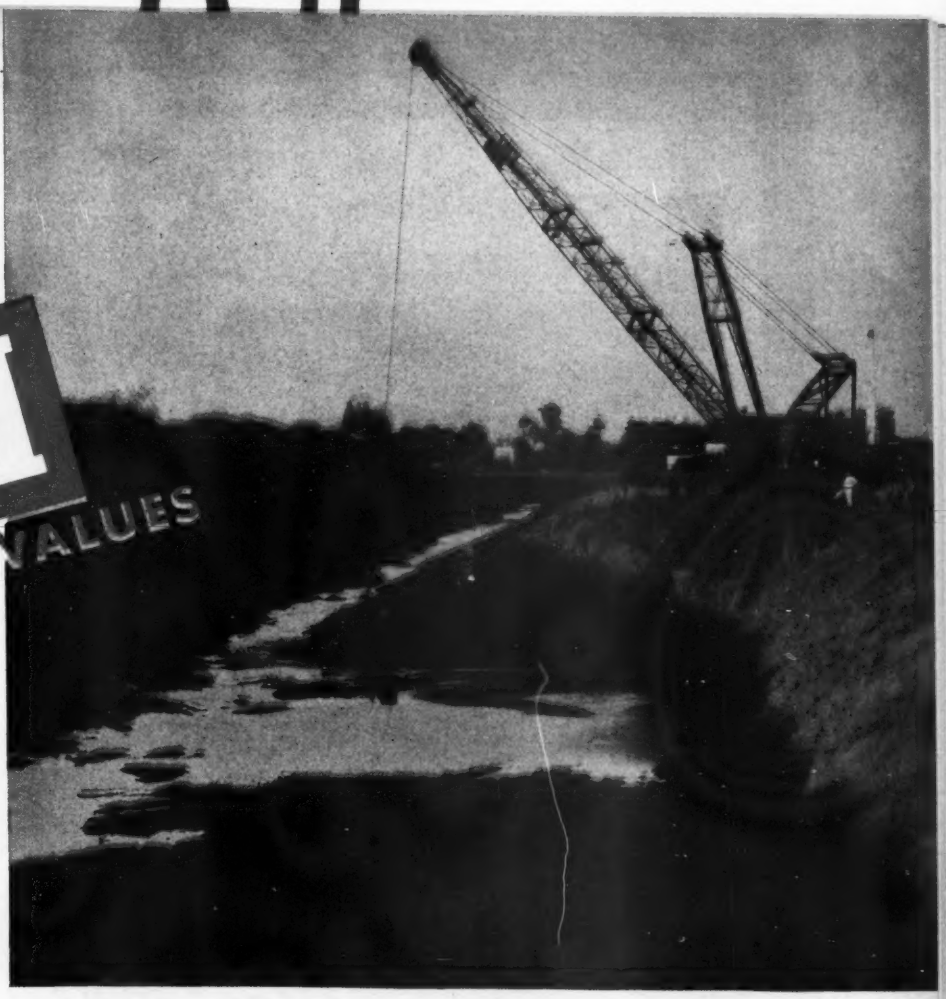
GOULD
KATHANODE
BATTERIES

GOULD STORAGE BATTERY CORPORATION, Depew, N. Y.
Service Centers: Atlanta • Boston • Buffalo • Chicago
Cincinnati • Cleveland • Detroit • Kansas City • Los Angeles
New York • Philadelphia • Pittsburgh • St. Louis • St. Paul
San Francisco • Seattle • Zanesville

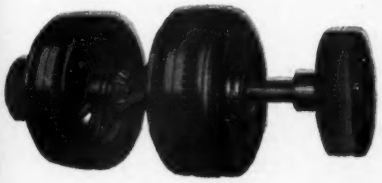
LOOK TO

P&H

FOR ADDED VALUES



"Slickest Swing we ever knew!"



THE P&H MAGNETORQUE SWING

Electromagnetic forces transmit power for both swing and propel . . . magnetic pull instead of mechanical friction. Electric current is supplied by a small generator on the main engine — controlled from operator's station. Swinging slow or fast, has cushioned acceleration and deceleration. Swing friction maintenance is eliminated. It's another important P&H Added Value.

You'll hear owners say it again and again — wherever you find the P&H Model 1055 on the job. And you'll find them all over the country.

It's not surprising that the P&H Magnetorque Swing should be such an outstanding success. For swing clutches have always been a major source of trouble.

ELIMINATES SWING FRICTIONS

P&H removed the cause of trouble by replacing the swing frictions with Magnetorque units, mounted in the same relative position. They transmit power for swing motions without mechanical linkage, without friction — without wear.

SPEEDS PRODUCTION

Swing is smoother, faster, more responsive. Quicker, more accurate starts and stops eliminate waste operating time—increase daily production — cut yardage costs.

NO MORE MAINTENANCE

You need never lose another day — or even an hour — because of swing clutch maintenance, repair or replacement. The P&H Magnetorque unit will last the life of the machine.

Users will tell you it's one of the most important improvements ever made in the field of large excavators. That's why users won't be without it . . . why they reorder. Ask for complete information.

P&H EXCAVATORS
4555 W. National Avenue
Milwaukee 14, Wisconsin

HARNISCHFEGER CORPORATION

BUILT BY DIFFERENTIAL STEEL CAR COMPANY
BUILT BY CARNEGIE-ILLINOIS STEEL COMPANY
SPEED WITH SAFETY
. . . FOR THE WORLD'S LARGEST MINE

They move coal faster, safer, at less cost, at the H. C. Frick Coke Company's Robena Mine because 1600 mine cars, as well as supply cars and locomotives, are equipped with Willison Automatic Couplers of the self-centering type.

These modern couplers permit swift and sure gathering and shunting with less coal spillage. At Robena Mine, entire trains of cars are unloaded on rotary dumps, without uncoupling. All this means greater speed, greater safety, more tonnage per day at less cost.

These improvements in speed, safety and economy have been proved by many mine operators. Our engineers will work with you and your car builders to help you obtain the same profitable results with Willison Automatic Couplers.

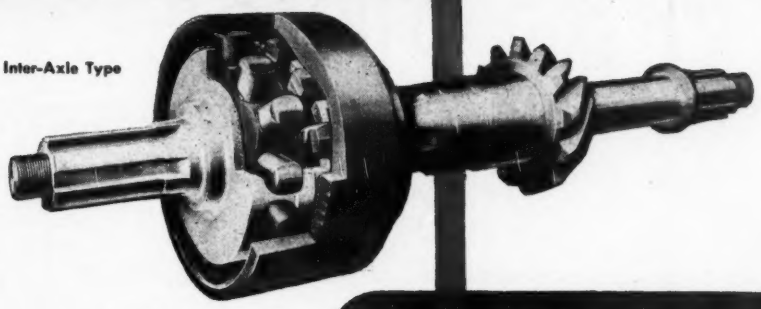
M N S Co

ESTAB. 1868

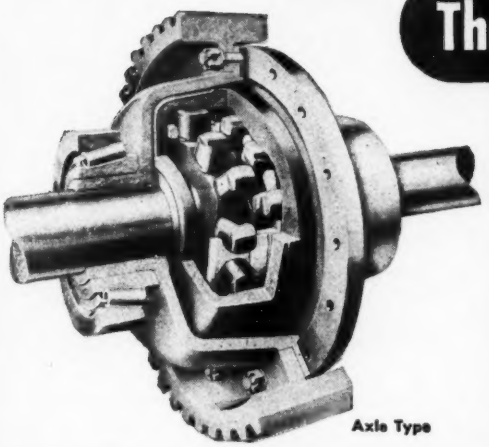
NATIONAL MALLEABLE and STEEL CASTINGS CO.

Cleveland, Ohio

SALES OFFICES: Cleveland, Chicago, New York, Philadelphia, Richmond, San Francisco
WORKS: Cleveland, Chicago, Indianapolis, Melrose Park, Illinois, Sharon, Penna.



Inter-Axle Type



Axle Type

These lick tough terrain...

These are the two types of the Mack Power Divider...another exclusive Mack development...the best way yet devised for preserving traction on slippery ground.

Positive traction with true differential action is assured by the Mack Power Divider. It contains no gears. It exerts no end-thrust. It is designed to transmit more torque to wheels maintaining traction...less torque to slipping wheels.

Serving as a third differential, the Inter-Axle type is used in all Mack four-wheel drive bogies for six-wheelers. It is a means of dividing power between the driving axles. This allows speed differences between the axles and makes up for unevenness in road or tires.

In either four- or six-wheel Macks for off-highway service, the Axle-type replaces the conventional differential, with which it is interchangeable.

The Power Divider is another example of how Mack designs and builds trucks down to basic working parts to meet specific job demands.

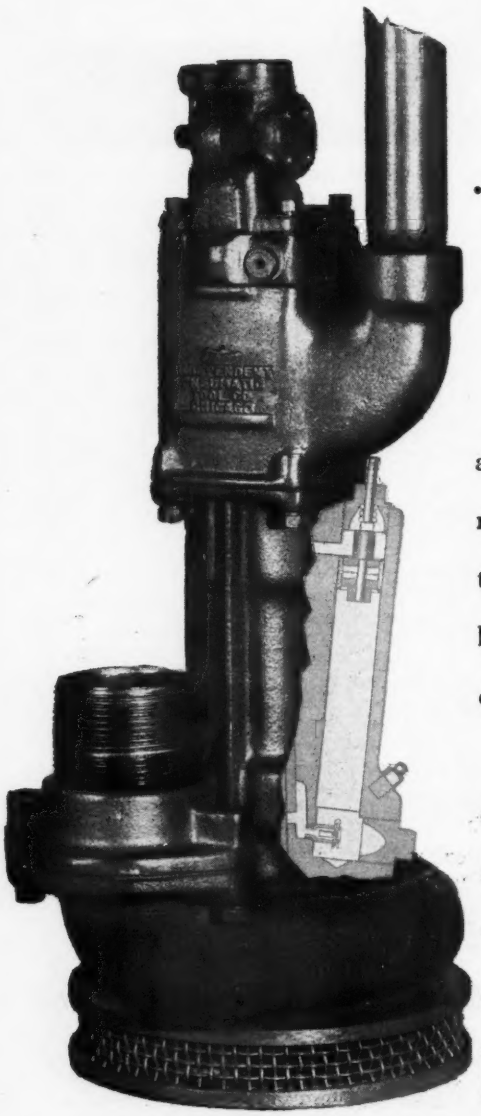
Trucks for every purpose

Mack **since 1900, America's hardest-working truck**

Mack Trucks, Inc., Empire State Building, New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts. In Canada, Mack Trucks of Canada Ltd.

THIS BIG, fast and powerful new Mack model LR 15-ton dumper, is one of several in the service of **Marquette Cement Manufacturing Co., Cape Girardeau, Missouri.**

Thor SUMP PUMPS Keep Pumping!



. . . *Improved Lubrication Assures Peak Efficiency*

In Sump Pumps, the *impeller shaft bearings* are the most vulnerable parts, with premature failure causing undue job delay and expense. Thor safeguards these vital points by a large grease reserve that is force-fed under continuous air pressure—pressure that further prevents foreign matter from working into the bearings. Because of this *exclusive feature*, Thor Pumps can be operated continuously up to a full shift without regreasing.

Thor Sump Pumps are designed to operate efficiently in clean or dirty water; in oil, sludge or sewage—either partially or fully submerged. Your nearby Thor Distributor will gladly demonstrate them as the economical answers to your sump-water problems.

INDEPENDENT PNEUMATIC TOOL COMPANY
600 W. Jackson Blvd., Chicago 6, Illinois

Birmingham Boston Buffalo Cincinnati Cleveland Denver Detroit
Houston Los Angeles Milwaukee New York Philadelphia Pittsburgh
St. Louis St. Paul Salt Lake City San Francisco Toronto, Canada London, England

Thor PORTABLE POWER TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

ALL DAY...EVERY DAY...
EXIDE-IRONCLAD BATTERIES
KEEP THEM ON THE GO

When shuttlecars, locomotives and trammers are powered by Exide-Ironclads, you can count on full-shift availability day after day, month after month. Loaders are kept busy, car change time is reduced, haulage is speeded up all along the line . . . and with maximum safety and economy.

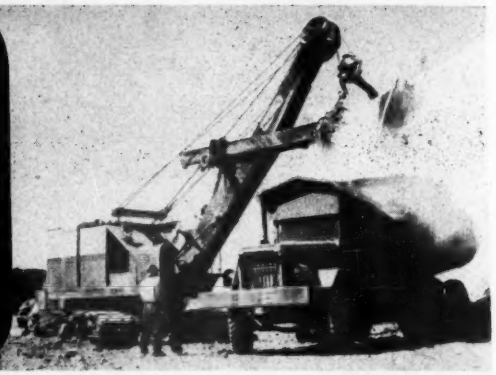
Exide-Ironclad Batteries have the *high power ability* that frequent stop-and-go service demands . . . a *high maintained voltage* throughout discharge . . . the *high capacity* needed to assure peak performance . . . plus the dependability, long-life and ease of maintenance which mining service requires.

If you have a special battery problem, or wish more detailed information, write for booklet Form 1982.

SAFE POWER

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • Exide Batteries of Canada, Limited, Toronto

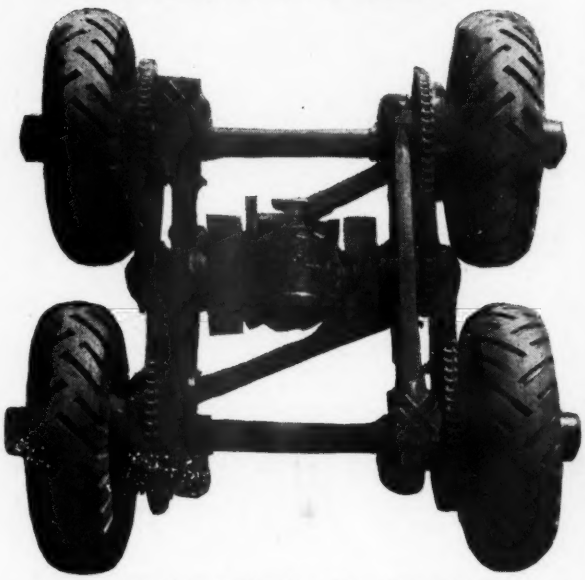
KNUCKEY
HEAVY DUTY TRUCKS



KNUCKEY TRUCKS haul larger pay-loads at lower costs. Shown is one of a fleet of 14 on the Castle Dome Copper Company's ore haul, Gila County, Arizona.

Knuckey trucks are designed and built to exacting standards for the one service—Off-the-Highway hauling—Mining—Logging and heavy construction projects.

The 22½ yard Knuckeys delivered to Castle Dome Copper Company (see page 46) were used in the construction of plant, facilities and for the stripping operation before they were put on the ore haul. We are informed that these trucks have been on three shifts per day, seven days per week since they were delivered July 3, 1942, now four years and five months, but on a three-shift schedule, the equivalent of 13 years normal service. From the start of this operation to April 30, 1946, these trucks have hauled 27,694,775 tons and they have operated a total of 1,014,292 miles.



Dual Drive Axle showing clean design, light weight and simplicity of construction. (Patented.)

The above unit, using this same dual drive axle, was designed and a pilot model built for the U. S. Army Ordnance and it became the now famous M-26 Tank Recovery Tractor which was so successfully used in the European Theater of War.

NOW THE NORMAL RATED CAPACITY OF THIS TRUCK IS INCREASED TO 145,000 POUNDS.

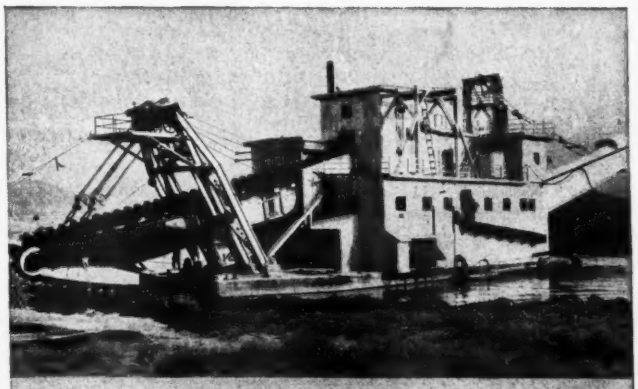
With our heavy duty front axle we now use the same sized tires on all wheels which permits better weight distribution and makes for better tire mileage and more positive steering when turning at the shovel or the dump.

Your Inquiry is Solicited.

HAUL MORE AT A LOWER COST

1345 Seventeenth Street **KNUCKEY TRUCK COMPANY** San Francisco, California

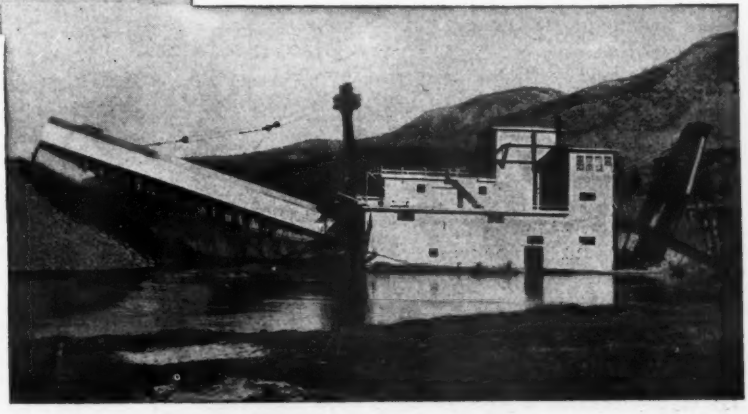
DREDGES FOR THE WORLD'S PLACER FIELDS
--by YUBA



Dredges for frozen placer ground of the Far North may look somewhat like those used in the tropics. A California dredge mining gold from relatively loose gravel looks much like a Malayan tin dredge. But to experienced dredgemen and designers there are few points of similarity except in general appearances.

Every Yuba Dredge is designed for maximum recovery of metal under the peculiar condition of a given placer field. Nearly forty years of constant placer dredge designing experience is in the background of modern Yubas. Hard bedrock, deep ground, excessive sand, clay conditions and boulders are only a few of the special problems to be solved.

If your dredge is a Yuba, you are assured not only of high quality materials and workmanship but also of built-in experience gained from many jobs which may tie in with yours. Write for particulars and your questions will be answered by experts with world-wide experience designing and building placer dredges.



(Upper): PORTER BROTHERS' DREDGE, Helena, Montana. A gold dredge using 6 cu. ft. buckets to dig 35 ft. below water level.

(Center): A TIN DREDGE built by Yuba Manufacturing Company and operated in Malaya. It is equipped with 13½ cu. ft. buckets to dig 100 ft. below water level. No stacker is used; the tailings are discharged directly overboard from sluices. Jigs are used for tin recovery.

(Lower): YUBA CONSOLIDATED GOLD FIELDS DREDGE, Callahan, California. This dredge has 9 cu. ft. buckets and is equipped with machinery suitable for very hard digging conditions. Originally, it was designed to dig 35 feet below water level, but the hull and ladder will be increased in length later to provide deeper digging as the dredge moves into gravel deposits of greater depth.

YUBA DREDGES — PROVED DEPENDABILITY ROUND THE WORLD

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THE LIGHTS BURN LOW IN ENGLAND

IN February of this year the lights of England went dim. Production ceased at the factories, transportation came to a standstill; throughout Great Britain people shivered as heat and power failed, and the island was gripped in winter blizzards. The reason—no coal.

The economic, political, and social events responsible for Britain's declining coal production require no discussion. The impact of two world wars, the decline of available manpower, the loss of Britain's position as a creditor nation—possibly none of this could have been foreseen or avoided. However, there were measures available, measures that might have stemmed the tide.

The fault does not lie entirely with the coal producers although they must shoulder a portion of the blame. Unfortunately they did not mechanize their collieries despite the example being set across the English Channel where French, Belgian, and German producers were making every effort toward modernization. British owners also refused to merge small uneconomical mines to permit large tonnage production.

On the other hand, it is not fair to condemn the operators for difficulties inherent to coal geology in Britain. Much of England's coal requires deep shaft mining, much of the coal lies in low seams. A hundred years of intensive extraction have depleted the reserve of high coal and today the increased difficulty of mining is reflected in rising costs and difficult working conditions.

This situation was bad enough, but to make matters worse, the Government imposed a withholding tax on the workers, a tax which has obstructed every effort to obtain increased production. For example: a coal miner can be taxed 10 per cent during the work week for five days' pay, but his sixth day—which is on a time and a half for overtime scale—is taxed at a rate often exceeding 50 per cent. "The power to tax is the power to destroy," and here is taxation destroying the incentive to produce in Britain.

To further complicate an already difficult situation, the Labor Government has proved singularly inept at planning. Although warned again and again of an approaching winter fuel shortage, no attempt was made to ration or stockpile coal for a possible emergency.

Great Britain will "muddle through" at tremendous cost. An unusually severe winter is over and the acute stage of the crisis has passed. However, the Labor Government has made a poor showing. If this is an example of administration under a socialist system, we fail to see its advantages. Government control of coal mining in Britain has to date been an outright failure. Its chief accomplishment has been that of bringing a great nation to the brink of economic disaster.

VENTURE CAPITAL AND METAL MINING

THE past contribution of the prospector and the small mine operator to our economic life has unfortunately been forgotten by the public. Although our present industrial structure has been dependent in large measure upon the pioneering efforts of those who discovered and developed our mines, both industry and the Government seem to have forgotten that without a continuous flow of metals and minerals from our mining industry, the wheels of manufacturing will slow down and gradually cease to turn. Furthermore, there appears to be no understanding of the basic problems of mine financing.

Last autumn, the Western Division of the American Mining Congress, in a forthright "Declaration of Policy," made certain concrete recommendations. Difficulties encountered in primary mine financing were briefly analyzed and corrective measures indicated which would enable mine financing to be placed upon a sound basis.

In a paper on the "Treatment of New Mining Ventures in Canada and the United States," delivered at this same meeting, Ira B. Joralemon indicated the difference between the vigorous and enterprising policies of the Canadian Government as regards mining and the almost sterile situation which has developed within our own borders. There is nothing basically new in Canada's attitude towards the metal mining industry. The most remarkable feature is that we have forgotten so completely and so quickly our own dynamic past. Where Canada makes every effort to stimulate prospecting and help the small mine operator, our Government has taken an attitude of almost complete indifference. This was not always the case and there is no reason why metal mining should remain in a state of stagnation for an indefinite time in the future.

The suspicious attitude of the SEC towards mining venture is often reminiscent of "blue law" psychology. The development of new mines is considered a gamble very much in the same manner as a roulette game; the venture spirit of the Forty-niner is considered too speculative.

We are willing to finance many unproductive enterprises in the United States today. Apparently there are no barriers to the installation of race tracks other than those established by local laws. Yet when the opportunity comes to invest in productive enterprise, barriers seem to be interposed. In the Declaration of Policy referred to above it is recommended that the mining division of the SEC be immediately reorganized so that at least the man making the final decisions be experienced in the problems of prospecting and financing mining ventures. It is also recommended that the Securities Act and the Commission's rules be amended so that only the fraud provisions apply in offering and selling primary mining securities to the public, and that the various state restrictions be limited to the same coverage.

Certainly any revisions that would stimulate the search for mineral wealth would benefit our domestic economy. We should encourage, rather than discourage, new mining enterprise—too much is at stake if we neglect our minerals industry.

THE ENTERING WEDGE

THE seven paragraphs printed herewith are the Preamble of the Constitution of the International Union of Mine, Mill and Smelter Workers. Unfortunately this document, although by no means new, has received little public attention; it is our opinion that it should be read by every citizen concerned with the destiny of our nation.

This is an amazing foundation upon which to build a labor union within this country. In its opening sentence and throughout its entirety it paraphrases in concise and specific language the doctrine of Marx and Engels as expounded in the Communist Manifesto of 1848. Like this notorious but little-studied publication, the statement herewith is an incitation to class hatred, an attempt to drive a wedge between two elements of our population, in this case the employer and employe. Paragraph 3 should receive special attention, it is an outright condensation of Communist objectives adroitly rephrased.

If the International Union of Mine, Mill and Smelter Workers cannot do better than endorse a doctrine of Marxian origin, it is time that the fact be recognized. We are still sufficiently idealistic to believe in the American way. We still believe that the office boy can become general manager, that the man with the shovel can become chairman of the board. We still think that with energy, intelligence, and initiative any man can make a place for himself in our nation. Doctrines of social and economic stratification based upon a man's work are contrary to our tradition. The record is clear, the United States became a great nation largely because the class conflicts of Europe were left behind when men entered the portals of the new world. The names of poor immigrants adorn our history, men who became famous as industrialists, educators, scientists, and statesmen.

This doctrine is particularly repugnant to men in all branches of the mining industry. Too many individuals engaged in mining have risen the hard way; there cannot be many who accept the connotations of the above document without question.

"1. We hold that there is a class struggle in Society, and that this struggle is caused by economic conditions.

"2. We affirm the economic condition of the producer to be that he is exploited of the wealth which he produces, being allowed to retain barely sufficient for his elementary necessities.

"3. We hold that the class struggle will continue until the producer is recognized as the sole master of his product.

"4. We assert that the working class, and it alone, can and must achieve its own emancipation.

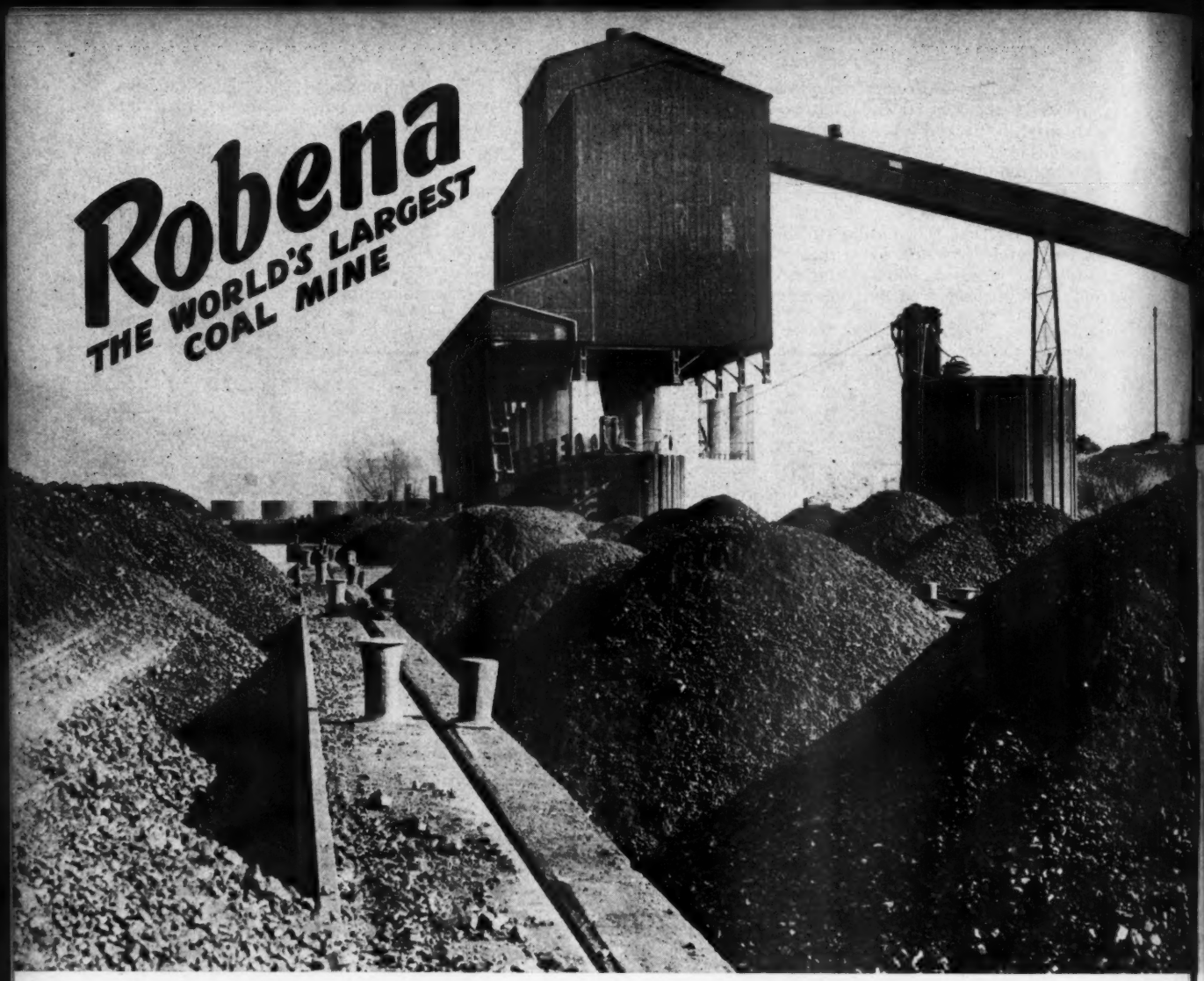
"5. We hold that an industrial union and the concerted political action of all wage workers is the only method of attaining this end.

"6. An injury to one is an injury to all.

"7. Therefore, we, the wage workers employed in and around the mines, mills and smelters, tunnels, open pits, open cuts and dredges, of the Western Hemisphere, unite under the following Constitution:"

Were it not for paragraph 5, one might assume that this was the introduction to a plan specifically designed to overthrow our American system by force, indeed such action is one of the aims of the Communist Party today in this country. Paragraph 5 recommends that "political action" is the means of attaining the desired end—a mere question of degree is involved.

If labor leaders in this country can sanction this doctrine, it is best that all who subscribe to democratic processes understand the implications. In a speech before the United States Senate more than a hundred years ago (March 14, 1834), Henry Clay stated: "The arts of power and its minions are the same in all countries and in all ages. It marks its victim; denounces it; and excites the public odium and the public hatred, to conceal its own abuses and encroachments." We do not think for a moment that any intelligent mining man can support the preamble to the Constitution of the International Union of Mine, Mill and Smelter Workers; nothing that we have read in recent times is more contrary to our American tradition.



Modern Mining Practice, Improved Equipment, and Sound Engineering are Combined to Give Record Production at the New Operation of the H. C. Frick Coke Company

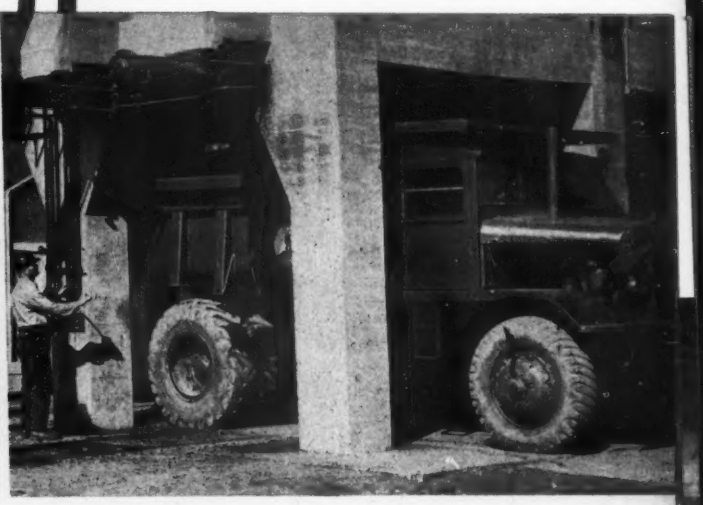
DESIGNED to produce 20,000 tons of metallurgical coal a day, or enough to heat 2,000 average homes for an entire winter, the Robena Mine of the H. C. Frick Coke Company, when it reaches its projected output, will be the world's largest coal mine. The mine was named for the mother of Harry Moses, now president of the Frick Company, and wife of Thomas Moses, former president of the company and retired vice president of the United States Steel Corporation of Delaware.

Development work began near the middle of 1937 with the driving of two parallel tunnels under the Monongahela River from the Ronco Mine of the company in Fayette County to open up a 65,000-acre reserve in the Pittsburgh No. 8 seam in the Greene County area. Twenty-three thousand acres in Greene County are now allocated to this operation. The present main shaft, known as the Colvin Shaft from the farm on which it was sunk, was started in June, 1942, and the slope leading to the river tipple was started in February, 1943. The Hartley Shaft, which is now used primarily for ventilation, was completed in 1946 and a third, known as the Gerrard's Fort Shaft, is now being sunk.

Seam Well Suited to Mechanized Mining

Before the Greene County area was opened tests indicated that a substantially higher sulphur and ash content existed than was present in the Fayette County coal. Early in the exploration, it was seen that for metallurgical use, Greene County coal would require beneficiation. Further, diamond drill cores indicated that certain sections of the area were considerably higher in sulphur and ash content than others. Since the sulphur and ash content of coal for metallurgical use must be held as low as possible, special arrangements had to be made, therefore, to blend the high and low sulphur mine run coal, and plans are laid to wash the entire product to reduce the sulphur and ash content. That operation, however, has not as yet commenced, although foundations for the coal-washing plant are now being laid. At present an acceptable product is being secured by merely blending the raw coal, as will be described later.

The twin-drum hoist at the Colvin Shaft is driven by a 900-hp. motor



Slate is loaded out through air-operated gates at the refuse bin

In general, the seam averages 96 inches in thickness and is well suited for mechanized mining. A seam of tender draw slate of variable thickness, which weathers rapidly when exposed to the air, lies immediately above the main coal seam throughout the greater part of the Robena reserves. Above this comes a seam of wild coal, in turn covered by a layer of brown shale or checker slate of variable thickness. Sandstone strata are usually found above the shale or slate.

COLVIN SHAFT SURFACE PLANT

The present main service shaft and surface plant for the Robena Mine is on the Colvin farm, from which it gets its name. This shaft, which is 15 ft. 9 in. x 38 ft. 10 in. in section and 454 ft. deep, is 2.6 miles, by underground haulage, from the mouth of the river slope where the coal is processed for shipment. It is lined with concrete ranging from 12 in. at the coping to 18 in. thick, 25 ft. above bed rock. The shaft is divided into four compartments, two for hoisting, one for ventilation (upcast), and the fourth contains a stairway. The three open compartments act as air intakes, the 150 sq. ft. upcast compartment being connected to the main exhaust fan.

Both hoisting compartments are used for moving men, materials, or equipment into or out of the mine. The framing of these compartments is extended above ground to connect with a reinforced concrete slate disposal bin through two single-car rotary dumps equipped with ram type car movers interlocked with the hoist. The slate bin is approximately 25 x 25 x 23 ft. and has a capacity of 275 tons. Refuse is drawn off through four air-operated gates into 15-ton heavy-duty dump trucks.

The hoisting equipment is housed in one end of a 50 x 109-ft. brick building, the other end housing the motor generators and switch gear. A 2-in. wire rope handles each cage at a rope speed of 900 ft. per minute, operating on a double cylindro-conical drum 8½ x 11½ ft. A 900-hp., 353-revolutions per minute wound-rotor motor drives the hoist. Two 300-kw. and one 500-kw. motor generator sets with semi-automatic control on the AC side and full automatic control on the DC side furnish direct current to the mine at 550 volts. In the mine 1,000,000-circular mill copper cables serve as feeder lines to the trolley wires. A 745-cu. ft. per minute compressor operating at 100 lbs. per square inch, powered by a 150-hp. motor, is also installed in the same room. All switch gear for the motor-generator equipment, as well as for the 2,300-volt distribution system, is installed along one side of the generator room. The 3,000 kva., 25,000-volt to 2,300-volt transformer station adjoins the building.

The main exhaust fan, which draws air from the mine up through the air compartment in the main service shaft at Colvin, plays an important part in the ventilation system. This unit is housed in a 24 x 40-ft. 8-in. brick structure adjoining the shaft and is a 96-in. diameter axial flow, 8-blade, 7-position variable-pitch fan capable of exhausting 300,000 cu. ft. of air per minute at 7.6 in. water gage with the blades adjusted to maximum pitch and operating at 900 revolutions per minute. Dual drive is provided and the fan may be operated at 900 revolutions per minute by a direct connected 500-hp. synchronous motor, or by means of 34 rubber cord V-belts on a jackshaft

Safety lamps are carefully cleaned, checked, and assembled in the lamp room

Power cable suspension unit at borehole

A track-mounted cutter on development. The line brattice at left insures a flow of at least 5,000 c.f.m. of air at the face

View showing amount and character of timber to assure safe working conditions in an open end crosscut

coupled to two 250-hp. induction motors. By a pulley change on the two-motor jackshaft the fan may be operated at 710 revolutions per minute.

Facing the shaft and slate bin is the lamp and bath house which provides modern accommodations for 1,345 miners and 45 foremen. This building is 80 x 170 ft. with a 14-ft. ceiling and includes two dressing rooms with overhead clothes drying facilities for the men, overhead unit heaters assuring good ventilation and comfortable conditions for changing. The building also houses the first-aid room and offices for the superintendent, mine foreman, cost clerk, and a pay-roll office with a fireproof vault. A well laid out lamp room, 28 x 94 ft. in size, provides facilities for maintaining 2,500 cap lamps, and necessary flame safety lamps. Two 15-kw. motor generator sets furnish charging current at 125 volts. Tag numbers are attached to the battery tops, which are so made that they can be removed only in the lamphouse. The tag rack, therefore, is specially designed to carry the numbered battery top with the attached cord and headpiece.

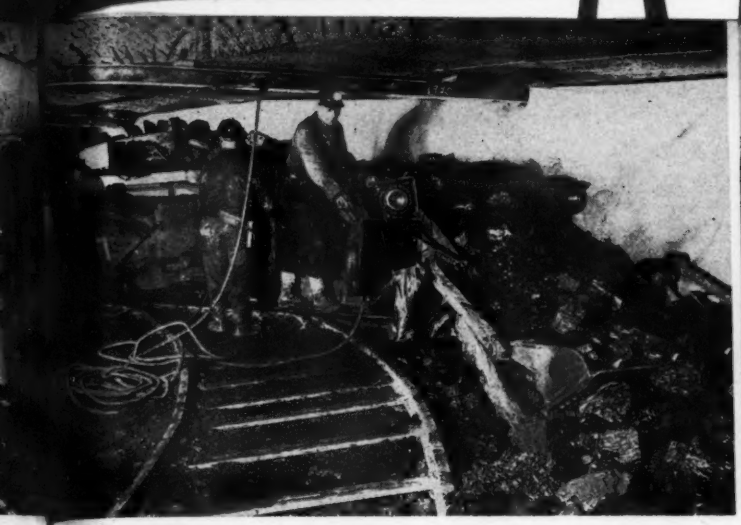
Separated from the main building by a 30-ft. road is the supply house, which is 40 ft. wide and 146 ft. long. The supply clerk's window overlooks a 30-ton platform truck scale in front of the building, the scale beam being located in the office. At the rear of the building is the rescue station, consisting of a 14 ft. 5 in. x 18 ft. 11 in. workroom, and 18 ft. 11 in. x 23 ft. apparatus room, and a 19 ft. 2 in. x 25 ft. airtight smokeroom used for training purposes. A fireproof oil and paint room is located at one corner of the supply building.

Behind the supply building is the boiler house, which houses two 125-hp. return tubular boilers. These furnish heat for the various mine buildings and at the same time assure and abundant supply of hot water in the bathhouse. A 30 x 60-ft. sand-drying house has one bin capable of holding 60 tons of wet sand and another which will hold 180 tons of dry sand. Two sand-drying stoves are used to dry the sand, which may then either be stored in the dry-sand bin or delivered direct to the mine through a 10-in. cased borehole, 490 ft. deep. The borehole is controlled by a valve located in the mine.

Other surface facilities at the Colvin shaft include two oil storage tanks and a barrel rack, a machine shop 126 x 45 x 14 ft. with facilities for making practically all major re-

Right: A shot-firer loads a hole. Packaged tamping is in the pails, powder in the leather sack at left, caps and fuse in his knapsack

Below: A track-mounted drilling machine in operation



Starting a crosscut. Note line brattice for ventilation and 6-in. steel beams for roof support

Having made the turn, the mechanical loader drives ahead

condi-

pairs to mine machinery and equipment, a motor truck garage, and storage buildings for rock dust and cement, pipe and other steel, and acetylene and oxygen.

Ample storage space is arranged for mine timbers, etc., connected with the shaft by 60-lb. track so that mine cars may be loaded in the yard and taken to the shaft top by means of a 6-ton diesel locomotive.

A surfaced parking lot with a capacity for 400 cars, serviced by 30-ft. roadways, is provided for the miners' convenience. Two 150,000-gal. wooden tanks on concrete foundations, elevated 161 ft. above the shaft coping, provide pressure for a fresh-water system, through 10-in. and 6-in. diameter mains with galvanized pipe service lines to the buildings on the surface.

MINING OPERATIONS

At Robena, as in the other Frick operations in the Connellsville region, the open-end system of mining is practiced. This system, pioneered and developed by the company for nearly 20 years, is readily adaptable to mechanization and permits a higher degree of safety, high coal recovery, positive roof control, a high rate of production per unit of territory developed, and low maintenance costs during periods of curtailed operation or shutdowns.

Track-mounted equipment is used throughout the mine. Three sets of main entries are now being developed and a fourth is planned in conjunction with the Gerrard's Fort shaft.

Main Headings

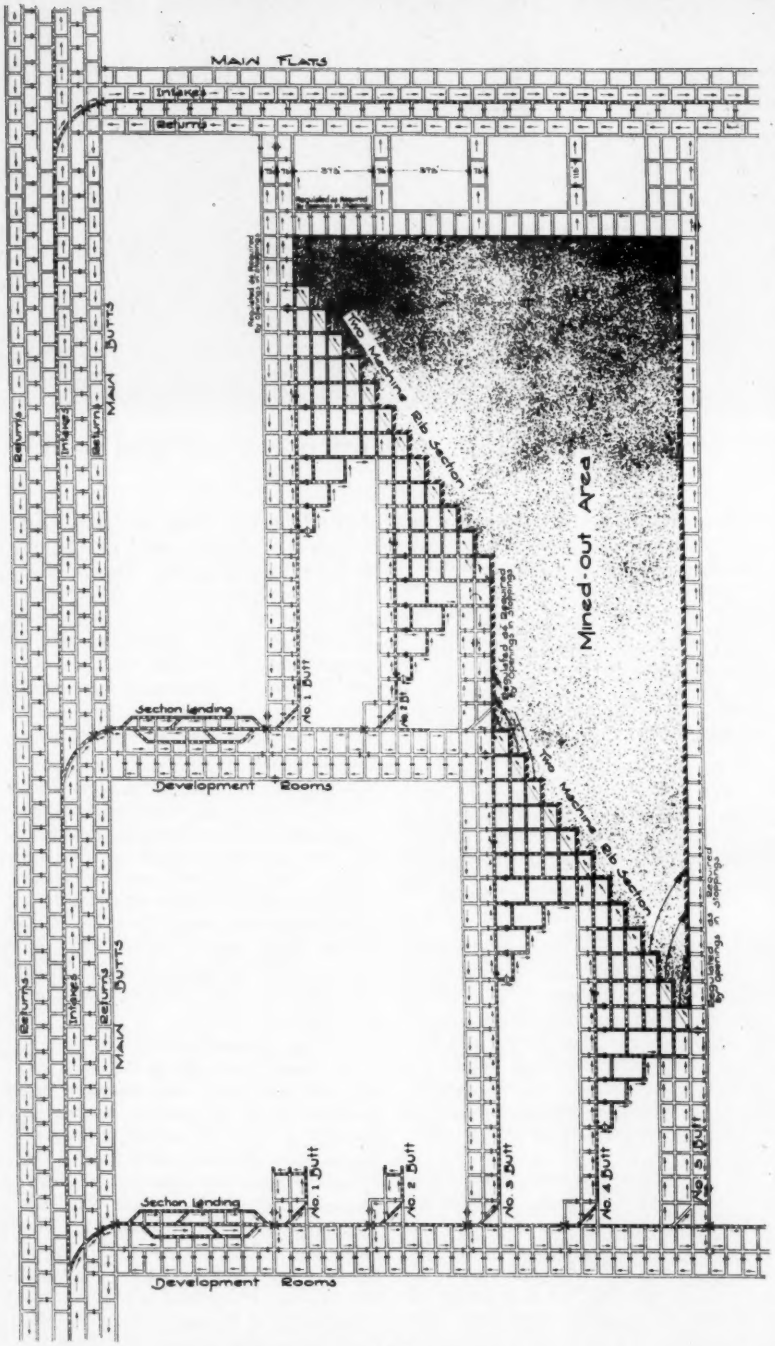
Eight to 11 parallel headings or butts are driven at 75-ft. centers, with three to five parallel flats or panel headings also on 75-ft. centers. Chutes are driven off the main headings at 60- and 90-degree angles on 105-ft. centers and from the flats and secondary butts at a right angle on 105-ft. and 115-ft. centers. The distance between main flats is approximately 2,300 ft. All development places and chutes are driven 10 to 10½ ft. wide, with a mineable height of 6½ to 7½ ft., which greatly improves working conditions. The high sulphur roof coal is left in place to protect the tender slate and keep the total sulphur content as low as possible.

In development entries four holes are drilled in each cut. Two holes 8½ ft. deep and 1¾ in. diameter are drilled straight back just above the 3-ft. binder. The rib hole is 6 in. away from the rib and the second is 5 ft. from the first. Two holes are started just below the binder and angled toward the bottom of the cut. Each of the top holes is charged with 1 to 1¼ lbs. of permissible explosive and the hole filled with packaged tamping material. About 2¼ lbs. of explosive is used in each of the lower holes, using electric detonators in each cartridge. The shot firer loads and shoots all holes, loading and tamping them at one time, but shooting them separately with a single-shot key-operated battery. Ordinarily three to five minutes are required to prepare a hole for shooting and one minute to shoot it. Shooting is done throughout all working shifts. The single-shot practice reduces the possibility of misfired shots. Approximately 25 tons of coal is brought down at each cut in the 10-ft. development work.

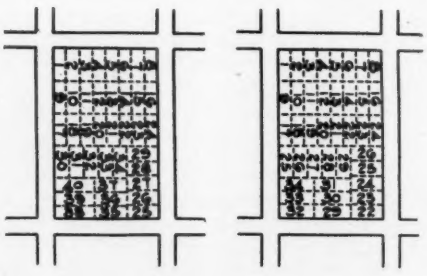
Pillar Extraction

Following development of main headings, butt headings are driven at 450-ft. intervals on 75-ft. centers, with rooms on 115-ft. centers to permit the development of retreating rib sections. Face and butt open-end cut-overs are driven 20 to 22 ft. wide at right angles to a room or chute. Cuts in all cases are 8 to 8½ ft. All development involves top cutting and shearing one side, the kerf being approximately 6 in.

In the open-end cut-overs production ranges from 42 to 56 tons per cut with six holes shot, average production being 45 tons. Production practice in open-end pillar mining involves top cutting, shearing 2 ft. from the gob, and making a second shear cut 6 ft. from the coal rib. This requires 30 to 35 minutes. Two holes are drilled on the solid side of the open end between the shear and the rib, one above and one below the 3-ft. binder, 6 in. away from the rib. Four holes are drilled between the shear on the gob side and the central shear, two above and two below the 3-ft. binder. These holes are drilled one above the other in pairs 4 ft. from each shear. Drilling requires five to six minutes per hole. Loading and firing is done in the same manner as in development work. As soon as possible after blasting the face is inspected for gas and roof condition and initialed for loading. The track-mounted loader is then run in and



Above: Fig. 1.—Typical projection for mechanical loading section in the block system



Right: Fig. 2.—Two methods of taking pillar cuts, showing sequence of operations

the loose coal loaded out into 6½-ton mine cars as rapidly as possible.

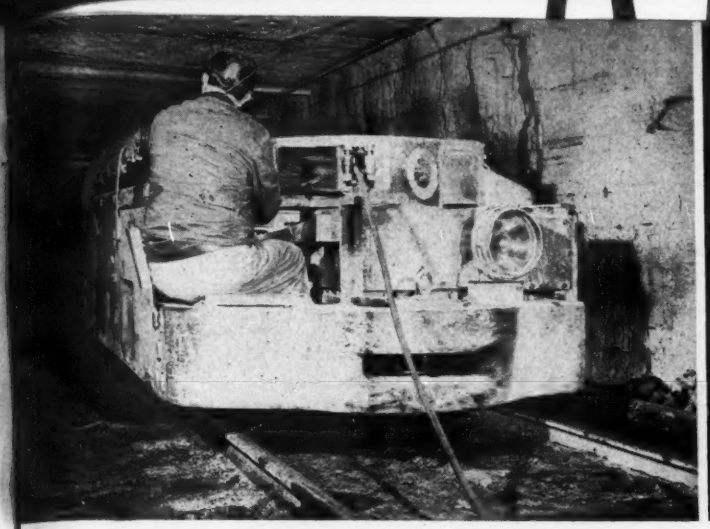
A loading machine and complete set of auxiliary equipment are assigned to each butt section. Figure 1 shows two of the two-machine rib sections. The angle of the fracture line is variable with the butt course depending upon top conditions. By December, 1946, there were 33 cutting machines and 31 loading units of various types in service in the mine, all equipment being track-mounted.

Butt headings must be developed at proper intervals to give each machine enough blocks of coal to permit the maintenance of a sustained and continuous face preparation and loading cycle on each butt section. Using a 450-ft. butt interval makes it possible to assign each loading machine six blocks of coal plus the necessary room and chute development ahead of the rib line. Once ventilation, haulage and drainage requirements are established on a rib line, only sufficient development is driven each day to maintain these requirements and to replace the development destroyed by the advancing rib line.

Positive roof action, with clean top breaks, is essential in any mechanized operation. In general, experience shows that suitable roof action can be obtained by keeping the line of rib extraction at an angle of approximately 45 degrees with the butt course. At Robena, coal blocks range in size from 47½ x 105 ft. minimum to 65 x 105 ft. maximum, permitting maintenance of the desired 45 degree angle.

High recovery is attained under the open-end system of mining. Face open-end cutovers and butt open-end places make it possible for the loading machines to attack the block of coal from two different directions; coal not mined by a face open-end cutover can be recovered from a butt place, or vice versa. Approximately 25 per cent of the recoverable coal is obtained in development work, but rib extraction in the Robena open-end system brings the total recovery to 90 to 95 per cent of the mineable height.

In the six-block single machine section, standard practice is to take out each 65 x 105-ft. block of coal in 40 cuts. Three open-end cutovers of eight cuts each are driven, followed by a butt open-end cutover of five cuts in the lower right-hand corner of the block. Next in the sequence is another face open-end cutover of five cuts, and finally two butt open-end cutovers of three cuts each.



One of the cable-reel gathering locomotives

Hitch timbering with steel beams assures a safe roof

Figure 2 shows the sequence of cuts in a block by two methods of attack. In the first, all cuts are taken in rotation. When intensive production is required, the plan shown in the second diagram (right) provides for taking the three top open-end cutovers and then attacking the block in cuts 22-26, and 29. If one cut per shift is made at each point of attack, extraction time is reduced by six shifts.

In actual rib extraction procedure, the straight-rotation practice (left) works well, keeping spare cuts available at the additional points of attack provided in the second (right) diagram. These spare cuts permit flexibility of operation and make fairly certain that a cut will always be available for the loading machine in each block in the correct block-rotation sequence, except on those shifts when falls are being made.

By arrangement so that different cuts are taken out of the various blocks on the same shift, it is possible to restrict the loss in production caused by making falls to a single block.

Roof Support Without Posts

On all main haulageways posts are eliminated for the most part and 6-in. CB steel beams with a 4-in. flange, weighing 16 lbs. per ft., lagged with 3 x 8-in. x 8-ft. treated plank, are installed for roof support. These beams, which are spaced on 7-ft. centers, are 14 ft. long and set directly in the rib or on masonry supports so as to leave the haulageway completely free.

A special track-mounted universal cutter with a 5-ft. cutter bar is used to cut the hitches in the rib, driving in a 7-in. kerf 18 in. wide to a depth of 4 ft. on one side and 2 ft. on the other. The beam is run into the 4-ft. deep cut and then returned to the 2-ft. cut, thus giving a minimum support of 18 in. to 2 ft. at either end. When the lagging has been applied, the beam is shimmed with tapered, treated wooden wedges as may be necessary, and the kerf at both ends is filled in with coarse material in cement mortar, after which the surface is faced with cement to exclude the air. This system of roof support eliminates to a great extent the use of posts along main haulageways and avoids the possibility of trouble in case a car should jump the track at a switch or on the straightaway.

In air courses the timbering consists of single or double rows of treated wooden posts set on 6-ft. centers, with treated crib blocks 5 x 6 x 30 in. used for cap pieces. Timbering in rib work normally consists of untreated cross-bars with posts set where necessary.

Before the first 20-ft. wide open-end cutover is made a 5-in. H-beam 20 ft. long and three cribs of standard untreated cribbing blocks (usually 20 to 30 blocks) are set in place. Two round untreated cross-bars on post legs and two gob posts are set with each cut and one crib set for each two cuts. Posts are set when and where needed and in the required number. This type of support is illustrated. Temporary steel jacks are sometimes used at the face to provide additional protection while a loading machine is loading out a cut.

Rail Haulage Standardized

All permanent haulage is 60-lb. rail, 44-in. track gauge, laid on 5 x 6-in. x 6-ft. treated wood ties ballasted with slate fill. Slightly more than 22 miles of main haulage has been placed in operation to date. As the heading advances 40-lb. rail is used, but is replaced by 60-lb. rail to within 1,000 ft. from the face as the grades are established. The layout is such as to provide separate haulageways for both loaded and empty trips. Maximum grade against empties is 4 per cent, but against loads the grade is limited to a maximum of only 3 per cent. Both rails on all main-line track are bonded with electrically welded rail bonds and cross bonded. Current is supplied by 1,000,000-cm. feeder cable to the No. 6/0 trolley wire on all main-line haulage. With the 235-cu. ft., 6½-ton, 8-wheel mine cars in use, a horizontal minimum clearance of 2½ ft. in the wide side is provided.

Main-line locomotives haul 35 to 40 cars per trip. These are 15-ton units arranged for tandem operation on 500-volt direct current. They are capable of running at 12 miles per hour with a full load. Underground shops for locomotive and machine repairs and for mine-car greasing, aid materially in keeping all equipment in good operating condition and available a high percentage of the time.

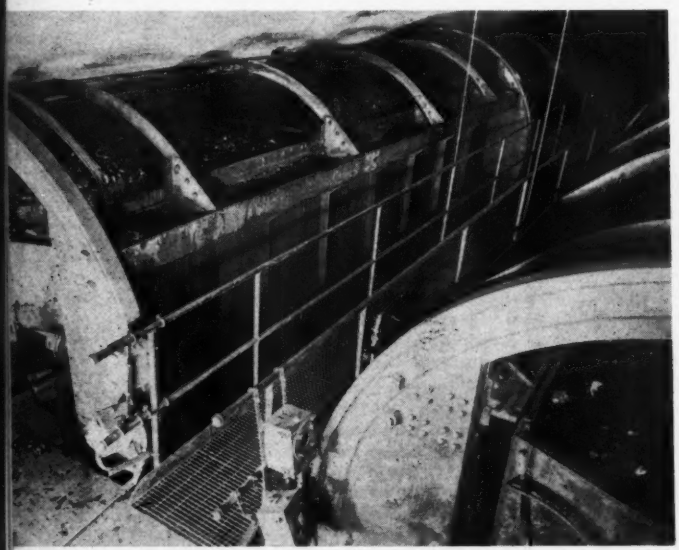
Forty-pound rail is used for secondary flat and butt track, being laid on 4 x 5-in. x 5½-ft. untreated wood ties. Only one rail is bonded. Relatively little grading is done for this secondary track, which follows the general contour of the seam. Side tracks and chutes for loaded and empty car storage are provided in connection with the single-track secondary lines. Side clearances are the same on secondary haulageways as on main lines. No. 4/0 trolley wire is sufficient in the secondary haulage system, which at present totals approximately 12 miles.

No grading, other than cutting off high bottom horsebacks, is undertaken in rooms, splits and cutovers. Single tracks with chutes for loaded and empty car storage are provided. Bonding on one side of the track is done but only to the end of the No. 4/0 copper trolley line, which normally extends to within 550 ft. of the face.

For convenience, rail lengths are standardized. All curves are 20-ft. radius which permits the use of a standard No. 2 frog. A shear cut at 45 degrees is made in the first cut at

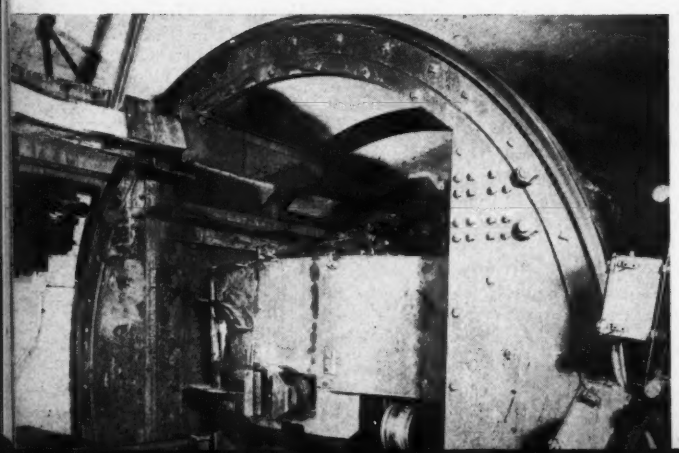
One of two 15-ton locomotives used at rotary dumps. The trolley can be shifted from left to right on a specially designed track

An underground track weighing station

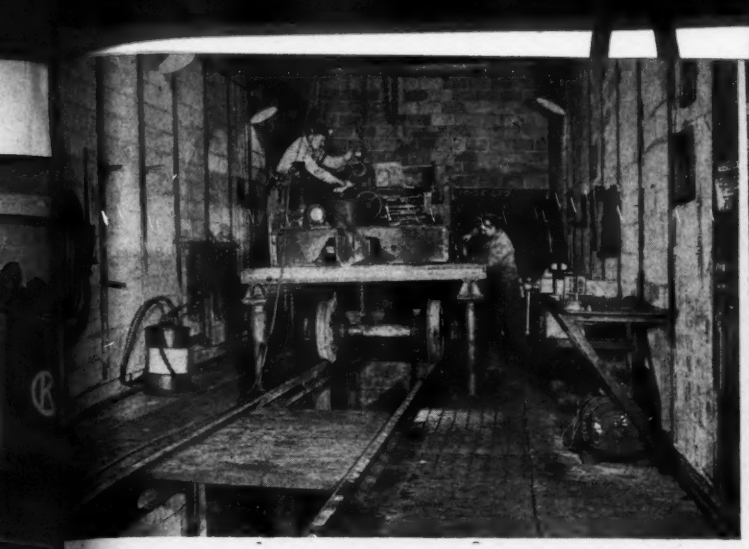


Twin 10-car rotary dumps assure quick handling of trips

Above: Setting the brakes in underground classification yard



Left: Photo-electric cells connected with motor circuit prevent dump operation before safe clearance is established



Mine locomotive on hydraulic lift in underground locomotive repair room

Car greasing underground. Note the excellent lighting

all intersection points on the inside of a curve to permit laying the curved track. In development places the track is laid to the left of center to permit maintenance of the wide side on the right looking toward the face. In open-end places, however, the track is laid in the center to assure that the entire width of the place can be cleaned up by the loading machine. A vertical minimum clearance of 5 ft. from the rail to the trolley wire is maintained, with 2½ ft. from the car to the rib in the wide side, and not less than 9 in. from the car to the canvas line brattice on the tight side. The line brattice is about 1 ft. 2 in. from the rib on the tight side of the track. Line brattice is shown in place in illustrations. Approximately 10 miles of this type of trackage is in service at Robena mine and experience shows that both track and tie recovery are almost complete.

Eight-ton cable-reel electric gathering locomotives are used. These are equipped with two 30-hp. motors and are capable of a speed of 5 miles per hour. Each loading machine is served by one of these units to take care of car changes. A swing unit is available for each machine or for a pair of loaders, depending upon their distance from the rib line and the amount of supplies that must be handled on the section. Car change distance is held to a minimum by the use of chutes and rooms adjacent to the block.

Three-track section landings are maintained at a distance of about 2,000 ft. from the working face. The size of trips accumulated on these landings is standardized to conform with general haulage requirements. Movement of main haulage trips is controlled by a dispatching system that covers the entire mine. This plays an important part in maintaining a high level of haulage efficiency. Coal is weighed on a recording automatic track scale just before the trips enter the classification yards.

Latest Design in Mine Cars

All coal-handling cars are 8-wheel anti-friction bearing units with a capacity of 235 cu. ft. level full and normally carry 6½ tons of coal. They are 15 ft. 3 in. long by 6 ft. 1 in. wide over-all and stand 4 ft. above the rail. Automatic couplers are installed at both ends, with the rear coupler swiveled so that the cars need not be uncoupled when they pass through the rotary dumps. Brakes are provided on the four rear wheels. Eleven hundred of these cars are now in service. Material cars are all-steel construction of the same general type as the coal cars, but stand only 21 in. above the rail. Powder cars are 4-wheel wooden units, completely insulated, including the couplings, with a capacity of twenty 50-lb. boxes.

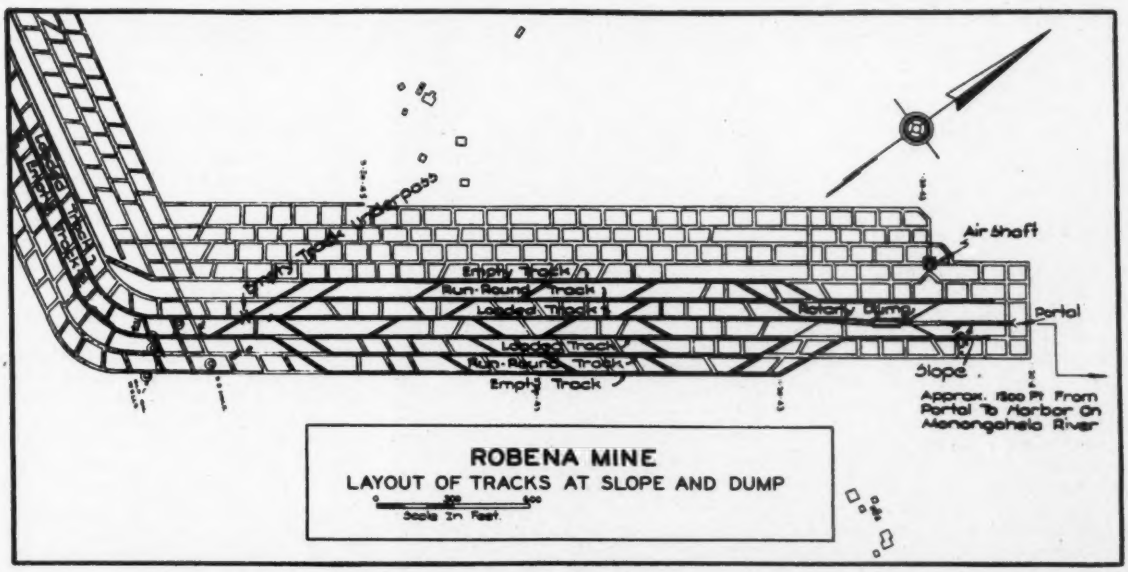
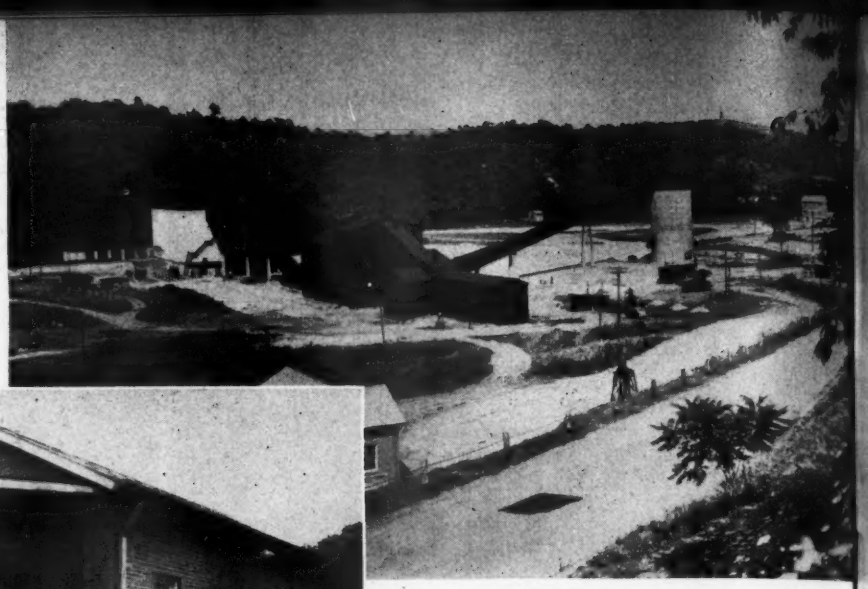
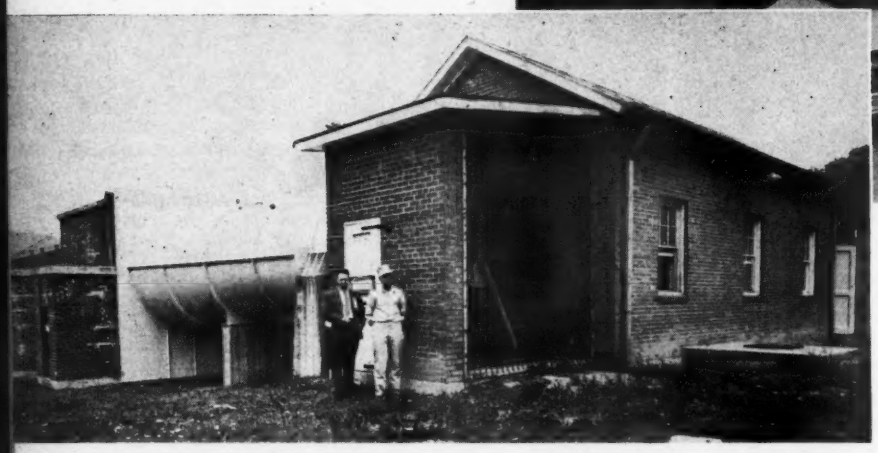


Figure 3

t: A general view of the surface plant and river tipple. preparation plant is in the center, blending bins and river e beyond. Circular silo refuse bin at right, and filtration plant at far right

w: An 84-in. axial type blowing fan is installed at the mine slope





specially arranged trolley poles which move from one side to the other. The trolley line in the rotary dumps is in both cases on the far or wall side. Along the loaded tracks in the classification yard it is on the left as one faces the exit end of the dumps. The special locomotive can cross one dump with the trolley on the outside, switch across to the other side as it goes for the loaded trip, and reverse the procedure as it takes the trip through the dumping operation without springing the pole. After a loaded train has been dumped it is switched back to one of the empty tracks in the classification yard by one of the dump locomotives and is picked up as a return haul by a main-line tandem locomotive.

Preliminary Blending

One of the major problems at Robena mine is to maintain a reasonably uniform sulphur content in the coal delivered to the barges. As development headings are driven, samples are taken to determine the average analysis of the raw coal. The order in which the sections are mined can thus be fixed so they will maintain a reasonably uniform analysis. Sections can be designated as "high sulphur" or "low sulphur" and when a trip leaves any section the motorman knows what type coal he is hauling. A six-track classification yard (Figure 3) is now nearing completion at the rotary dump station, four tracks already being in use. High-sulphur loads can be diverted to one side and low-sulphur trips to the other so that preliminary blending may be accomplished in the dumping operation.

Two 10-car rotary dumps, 147½ ft. long are in operation. These are operated jointly so that approximately 65 tons of each classification of coal will be discharged simultaneously into the 700-ton bins below. Each dumping mechanism is interlocked through photo-electric cells so that the dump cannot be rotated unless the cars are correctly spotted.

When a loaded trip comes into the classification yard it is left on the proper track and the tandem locomotive switched over to pick up a return trip of empty cars. The loaded trips are then taken through the rotary dumps by means of 15-ton electric locomotives, one being assigned to each dump. These locomotives have

SLOPE AND RIVER TIPPLE

As the loads of low- and high-sulphur raw coal are dumped in the twin rotary dumps underground the blending process begins. It is completed in one of the most unusual installations in this country. The mixed coal is fed onto the slope belt by means of ten 48-in. apron feeders. These are driven by 2-hp. 1,800 r.p.m., 440-volt motors through speed reducers and regulators and have a range of feed which may be varied between 50 to 300 tons per hour per feeder. The main belt which carries the coal out of the mine is 60 in. wide and approximately 757 ft. long between centers, with a total length of 1,607 ft. It has a total lift of slightly over 171 ft. and a capacity of 2,800 tons per hour when operating at 600 ft. per minute. Dual drive, with one 400- and one 200-hp. motor, is provided for this belt because of its long length and high lift. This main belt operates through a brick and concrete lined slope tunnel 15 ft. wide between walls, providing room for a 44-in. gauge service track alongside as well as a walkway. Safety stations are provided in the wall at 45-ft. intervals along the slope.

Near the dump pit a concrete-lined air shaft 105 ft. deep, elliptical in section (13 x 23 ft.), is provided, including a 50-sq.-ft. stair shaft separated from the air shaft by means of a 13-in. brick wall. The air shaft is connected with an 84-in. axial-type 8-blade, adjustable-pitch blowing fan capable of supplying 300,000 cu. ft. of air per minute at 2.5 in. water gage when operating at 945 revolutions per minute. This fan is driven through 15 V-belts by a 200-hp. synchronous

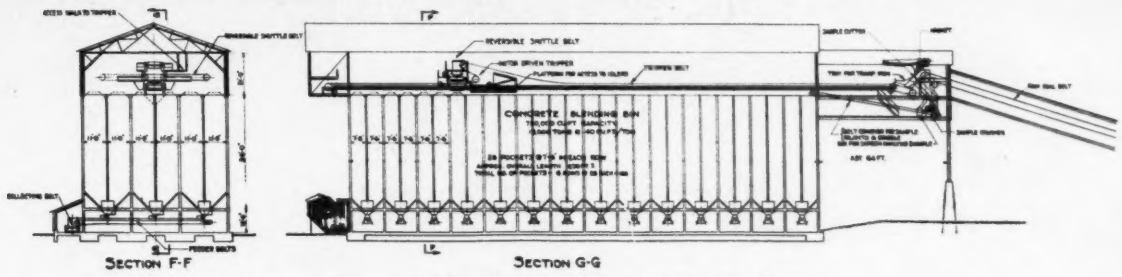


Fig. 4. Sketch showing arrangement of blending bins

motor operating at 900 revolutions per minute. A 500-kw. motor generator set, tied into the 1,000,000-cm. bus tie to the Colvin shaft, is located in an adjoining room and furnishes current to the mine haulage system in the vicinity of the slope bottom.

Screening Done Efficiently

At the head of the slope belt is the screen house, where the screens, picking tables and crushers are located. The raw mine-run coal discharges from the main belt to two 12 x 25½-ft. shaking screens with 3-in. round perforations which advance it to two more shaking screens 13 x 14 ft., also with 3-in. round perforations. These in turn feed the coarse product over four 6 x 21-ft. picking tables illuminated by eight 4-ft. fluorescent lights. Space is provided on each side of each table for slate pickers. Slate and refuse discarded by the pickers drops through chutes beside them to a short 36-in. collector belt, which in turn discharges to the main refuse belt. Fine coal (—3 in.) drops through chutes to the tail end of the crushed-coal belt.

Coal passing the picking table is delivered to two 12-ft. diameter by 17-ft. long trommel screen breakers equipped with 3-in. round perforations. The breakers are driven by 75-hp. 900-r.p.m. 2,300-volt motors through reducers and double steel roller chains. Slate or sulphur balls that are not reduced in the breakers pass through chutes to a reject belt, which takes the rejected material to a roll crusher. The 3-in. crushed reject is delivered to the main refuse belt. This belt is 36 in. wide, 5-ply and has a total length of 582 ft. It operates at 300 ft. per minute and has a rated capacity of 300 tons per hour, delivering rejected material to a separate 34-ft. diameter 60-ft. high concrete bin having a capacity of 1,000 tons. Two undercut gates are installed in this bin for unloading refuse into trucks for disposal. All refuse is weighed on a belt scale as it moves to the refuse bin.

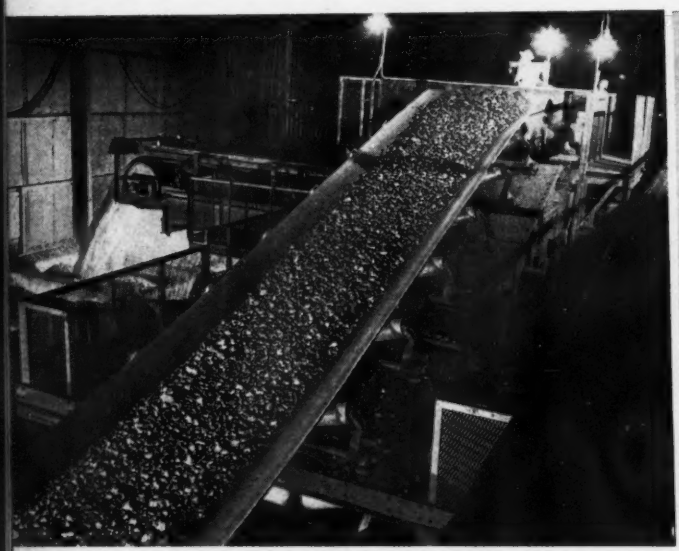
After having been reduced to minus 3-in size, the coal passes from the breakers through chutes to the crushed-coal belt conveyor, where, together with the minus 3-in. product from the shaker screens, it is picked up for delivery to the blending bins. This conveyor is a 6-ply 60-in. belt operating at 600 ft. per minute and has a rated capacity of 2,800 tons an hour, so as to handle all coal which can be delivered by the main slope belt. It has a lift of 76 ft. and is 381 ft. between centers, with a total length of 840 ft. Dual drive, using a 200- and 100-hp. motor, is used on this belt. All belts operating between buildings run through steel-framed galleries provided with concrete floors and sheathed with specially protected sheet-metal roofing and siding. Utility is combined with convenience in the hand railing installed in these galleries, the rails being 2-in. galvanized water pipe with hose outlets every 60 ft.

The main belt taking coal up the slope. Note service track for supply cars and stairway for men

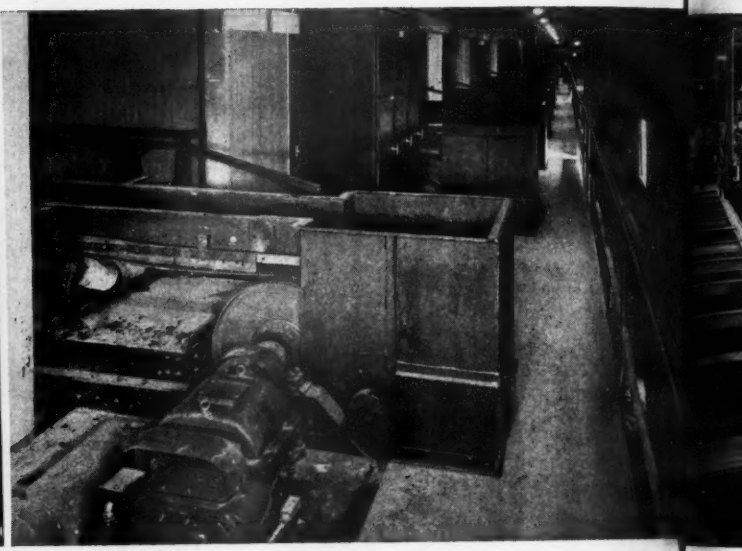
picking tables make it possible to eliminate most of the slate and sulphur balls before the coarse coal enters the crushers

Fine coal passing the 3-in. shaker screens comes down the chute in the background. Refuse from picking tables is on the conveyor in the foreground

Sampl



l is distributed into the 168 pockets of the blending bin by this 72-in. tripper belt and the cross shuttle belt



Fourteen belt feeders take coal from the blending bins to a 60-in. collector running below the walkway

Twin 60

At the head of the crushed-coal belt an automatic sampler takes a representative sample, which is passed through a chute to a 3,600-lb. per hour gyratory crusher, which reduces the sample to pass a ¼-in. screen. From the discharge of this crusher a splitting device withdraws a 350-lb. sample per 1,000 tons of coal for laboratory analysis. Unused coal from the sampler and crusher discharges to a 14-in. belt for return to the main tripper belt which takes the coal to the storage bins. A 65-in. diameter magnet suspended over the head end of the crushed-coal belt removes any tramp iron which may have passed the shaker screens or picking tables.

Blending Bin Assembly

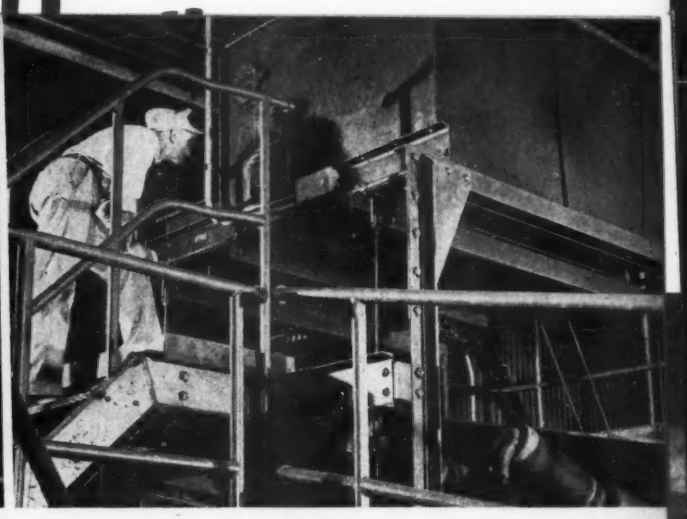
The heart of the blending plant is the battery of 168 pockets, arranged in six rows of 28 pockets each, the individual pockets being 7½ x 11 ft. in section and 56 ft. high, with a total capacity of 18,000 tons of coal, or approximately 108 tons per pocket. These are assembled into a monolithic unit 70 ft. 8 in. wide by 229 ft. 4 in. long, the lower story being 11 ft. high in the clear and built with division walls to provide space for 14 belt feeders (Fig. 4).

Crushed coal is transferred from the 60-in. conveyor to a 72-in. tripper belt running from the headhouse over the top of the bins, centered over the middle wall. The tripper belt is a 7-ply unit, 293 ft. between centers, with a total length of 630 ft., and operates at 440 ft. per minute. Like the other main belts, it has a rated capacity of 2,800 tons per hour. This belt feeds to a 72-in. shuttle belt on the tripper, discharging directly to any of the six pockets in a given row. Under present operating conditions each of the 56 cells in one set is filled one at a time, consecutively. The present practice is to be filling one set of cells, withdrawing from another, and holding a third set either empty or full to provide surge capacity that will level out the mine dumping rate and permit uniform withdrawal of the coal.

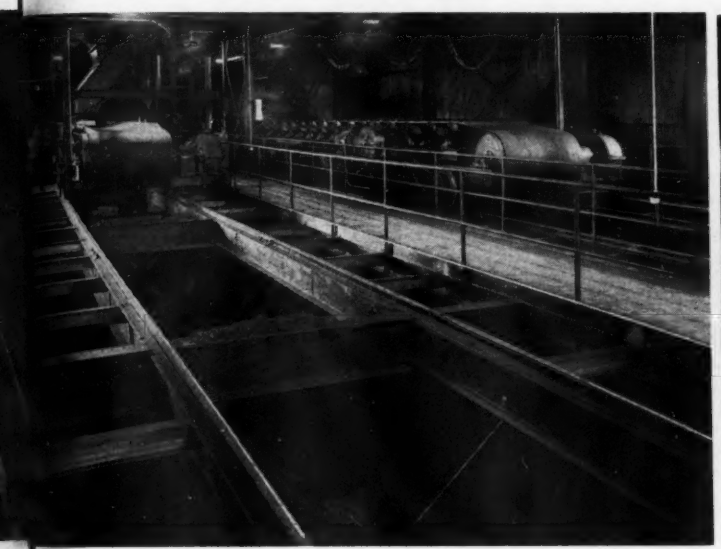
Control of Blending

Coal is withdrawn from the blending bin by means of three rows of 14 undercut gates, each delivering to one of the 14 cross-feeder belts which discharge to a collector belt. The cross-feeders are 5-ply, 36-in. belts, 65½ ft. on centers, centrally located under the groups of four pockets, each of which has a common opening. Only one of the three bottom bin openings to each feeder belt will be open at a time, but one gate will be open over each of the 14 feeders and all gates will be in the same set of

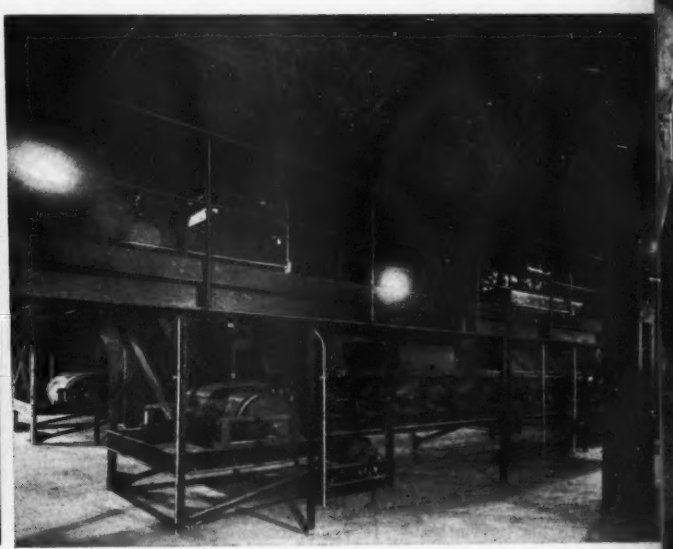
Sample crusher and sample box. Conveyor in foreground takes unused coal and returns it to main crushed coal bin



This conveyor scale weighs all coal that goes into the blending bins



Twin 60-in. shuttles load the crushed and blended coal from the blending bin into 14 pockets at the river tipple



Seven 60-in. feeder belts take the coal from the tipple bins to the seve charge chutes for barge loading

pockets. Withdrawal is not begun from any set until all pockets in that set have been completely filled; one set is ordinarily held in reserve to assure uniform operation. The operation of the gates and feeder belts is arranged for remote control and so interlocked that only one row of 14 gates can be operated at a time. In the drive of the feeder belts is a speed regulator with a range of 25-75 ft. per minute to permit coal withdrawal to be regulated closely. Controls for these 14 belts are installed on the main control panel located near the head end of the collector belt. This board also carries the rateograph which records the rate in tons per hour at which coal is withdrawn from the bins.

All 14 feeder belts deliver to a 6-ply, 60-in. collector belt which runs in a covered aisle or lean-to along the east side of the bin structure. This belt is 230 ft. on centers, or 480 ft. long, and operates at 600 ft. per minute, delivering the blended coal to another 60-in. transfer belt, which is installed at a horizontal angle of 62½ degrees. A 14-in. dribble belt is installed at the head end of the collector belt to catch any coal scraped off the collector belt as it discharges to the main transfer belt and return it to the tail end of the transfer belt. Coal delivered from the collector belt at any time represents a blended average of 6,000 tons of production from the mine. Careful scheduling of underground delivery of coal from the various working faces to the rotary dumps serves to assure that the coal is approximately balanced as to sulphur content when dumped and the blending procedure assures a high degree of uniformity in the product as prepared for shipment.

Transfer Belt Installation

The transfer belt takes the blended coal over to the main tipple belt, moving it horizontally about 102 ft. and vertically about 25 ft. At the head end of this belt another automatic sampler and crusher is installed so that a constant check can be maintained on the analysis of the coal being shipped. Excess coal from the sampler is returned to the tail end of the tipple belt. The chute from the transfer belt to the river tipple belt is arranged so that it can be changed at a later date to deliver coal from the transfer belt to another conveyor which will take it to the special cleaning plant designed to reduce the total sulphur content. This plant is now under construction.

All coal on the transfer belt is weighed over a special recording belt scale installed near the tail end of the belt. Tonnage recorded on this

scale plus that recorded by the scale on the refuse conveyor belt should equal the net tonnage returns from the underground station where coal is weighed in the mine cars on its way to the rotary dumps after correction for tonnage stored in the blending bin.

Features of River Tipple

The river tipple, for loading barges for shipment to United States Steel's Clairton by-product coke plant, is approximately 80 river miles south of Pittsburgh. At present all blended coal is discharged from the transfer belt directly to another 60-in., 6-ply belt 362 ft. between centers. This operates at 600 ft. per minute and is rated at 2,800 tons per hour, raising the coal 66 ft. to the top of the river tipple. This belt, like the crushed-coal belt which takes the coal to the blending bins, is also equipped with a dual drive using one 200-hp. and one 100-hp. motor. The tipple is a modern steel structure 40 x 135 ft. in size with a live storage capacity of 2,000 tons of coal. Two 60-in. shuttle belts take the coal from the main belt and "layer load" it into 14 pockets in the tipple. These shuttle belts operate at 350 ft. per minute and are set on 70-ft. 3-in. centers.

Coal is withdrawn from the tipple pockets through 14 undercut gates delivering coal to seven 60-in. feeder belts set on 40-ft. centers and running at 330 ft. per minute. These belts in turn discharge to seven telescopic barge loading chutes which can be extended or retracted or raised or lowered as desired by individual electric hoists. Gates are motor-driven and interlocked so that only seven can be opened at one time, one gate delivering to each feeder belt. All controls for the gates, feeder belts, barge loading chutes and barge moving equipment are housed in a heated cabin suspended over the loading point, permitting the operator to have a full view of both empty and loaded harbors. Two double-drum barge movers are available, one arranged to move barges up or downstream at the loading fender and the other to pull in and handle empty barges. It takes approximately six minutes to fill and balance an 800-ton barge and under normal operating conditions approximately 25 barges a day will be loaded.

New Harbor Constructed

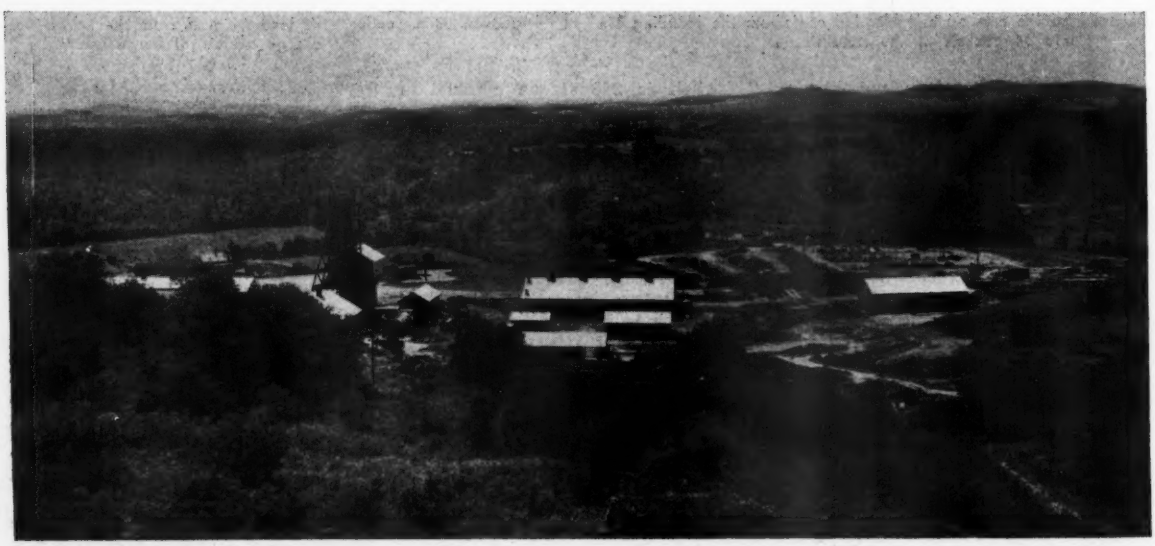
In preparation for the erection of the river tipple, a cofferdam was built around the foundation site. After pumping out all water from the cofferdam the river bottom and bank was excavated to solid rock and approximately 6,000 cu. yds. of concrete poured for the foundations and wall. The river face of this wall is equipped with a timber fender consisting of 6 x 12-in. creosoted timbers. Three circular piers approximately 25 ft. in diameter and two 15-ft. piers serve as ice breakers at the upper end of the harbor. These were built of sheet steel piling driven to rock and filled with river gravel, the tops being capped with 2 ft. of concrete. Six 15-ft. circular mooring piers are provided at the empty harbor and eight similar piers were built for the loaded harbor. These, like the ice breakers, are built of sheet steel piling, filled with river gravel, and capped with 2 ft. of concrete. The empty harbor was dredged to 6 ft. below pool level and the loaded harbor to 11 ft. below pool. Approximately 43,000 cu. yds. of material was dredged out of the harbors and deposited on the bank near the tipple above high-water mark.

Filtration Plant

A modern 1,000,000-gal. continuous gravity type water-treatment plant provides treated, filtered water for the mine, all drinking and sanitary water required at the river site and main service plant, with ample capacity for providing water for the coal-washing plant now under construction. Water for use in the mine and at the Colvin shaft is pumped through a 10-in. line running through the mine from the slope air shaft to a borehole adjacent to the main service shaft, and from there to storage tanks at the Colvin shaft.

The filtration plant draws water from the Monongahela River through an 18-in. cast-iron intake on the downstream side of the ice-breaker piers to a 10-ft. circular raw-water well. Duplicate 700-g.p.m. motor-driven raw-water pumps, housed near the river bank, pump the raw water to the filter building, where the lime and alum are added and the water passes on to a 168,000-gal. reinforced concrete settling basin equipped with over and under baffles. This has a four-hour capacity and allows ample time for coagulation and settling.

In the filter building are two reinforced concrete filters, each of which has an operating capacity of 500,000 gal. per day. These filters feed to an 180,000-gal. reinforced concrete clear-water well underneath the building. Four dry-feed chemical machines, three active and one spare, and an active and a spare chlorinator are installed in the filter building. Duplicate 700-g.p.m. deep-well type clear-water pumps assure ample water supply to the mains at all times. The building also houses a modern laboratory equipped for testing both raw and treated water.



A general view of the surface plant at the Colvin Shaft

The Rico Argentine

The Van Winkle Shaft at Rico

The Introduction of Modern Mechanical Methods has Made Possible the Reopening of Properties in the Pioneer District of the San Juan. Today no Hand Mucking Is Used Underground; a Seven-Year Continuous Mill Run Indicates that Mechanization has been Worth the Effort

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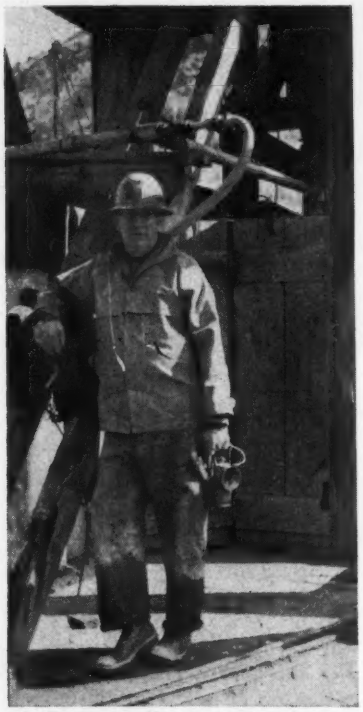
J. A. Hogle & Co.
Salt Lake City

THE endeavor to make new mines out of old mines is more than a pastime for western mine operators. The process involves *making a mine* rather than finding one. Ore was found in the Pioneer District of western Colorado in the 70's, and the record of the following 30 years contains its share of stories of killings by Indians and claim-jumping by whites. It was appropriately named the Pioneer District.

Gold and silver were the two principal metals produced in the Rico area; early production amounted to between $8,000,000 and $10,000,000, chiefly in silver. Development of precious metal ores during these early years indicated the presence of base metal sulfide deposits. The extraction of lead, copper, and zinc was begun and has been carried on intermittently during the past quarter century with surges and recessions in accordance with market specifications and prices. The year 1941 placed emphasis on base metal production, and the Rico Argentine Mining Company, now one of the principal producers of the state of Colorado, patriotically did its full duty.

In 1911, Fred Price, a Salt Lake mining man, organized the Rico Argentine Mining Company on claims approximating 240 acres. He was able to keep at work sporadically through periods of good and bad times until dividends were earned in 1928 and 1929. As mining fell upon the "evil days" of the crash and subsequent depression, the mine was inactive for a number of years. During that time other operators withdrew and the camps of the Pioneer District were fast approaching the status of "ghost towns."

In 1937, James A. Hogle, of Salt Lake City became interested in Rico and in the short space of two years the company's financial structure was revamped and a new and efficient lead-zinc selective flotation mill erected. Mining operations under the able direction of C. T. Van Winkle, general manager, began to bring results. With the introduction of modern mining machinery, medium-grade lead, zinc, and copper ore began flowing into the 115-ton daily capacity mill, and dividends accrued to the stockholders. Mr. Hogle and Mr. Van Winkle acquired the mining claims and buildings formerly owned by the companies that had withdrawn from the



C. T. Van Winkle, president and general manager, at the Atlantic Cable Shaft

district and placed them at cost with the Rico Argentine Company. The original group of 240 acres has now grown to more than 3,000 acres of mining claims. In addition, timber land totaling 1,000 acres is held by the company. The concentrating mill has continued to operate from 1939 to date without a shutdown and manages to keep pace with production of approximately 3,000 tons per month. The continuity of efficient management under Mr. C. T. Van Winkle, who is president of the company, with the application of the best and most modern equipment, has made a success of these old mines. The business and financial affairs of the company are under the direction of Mr. J. E. Hogle, assistant manager.

Three Mines Operated in District

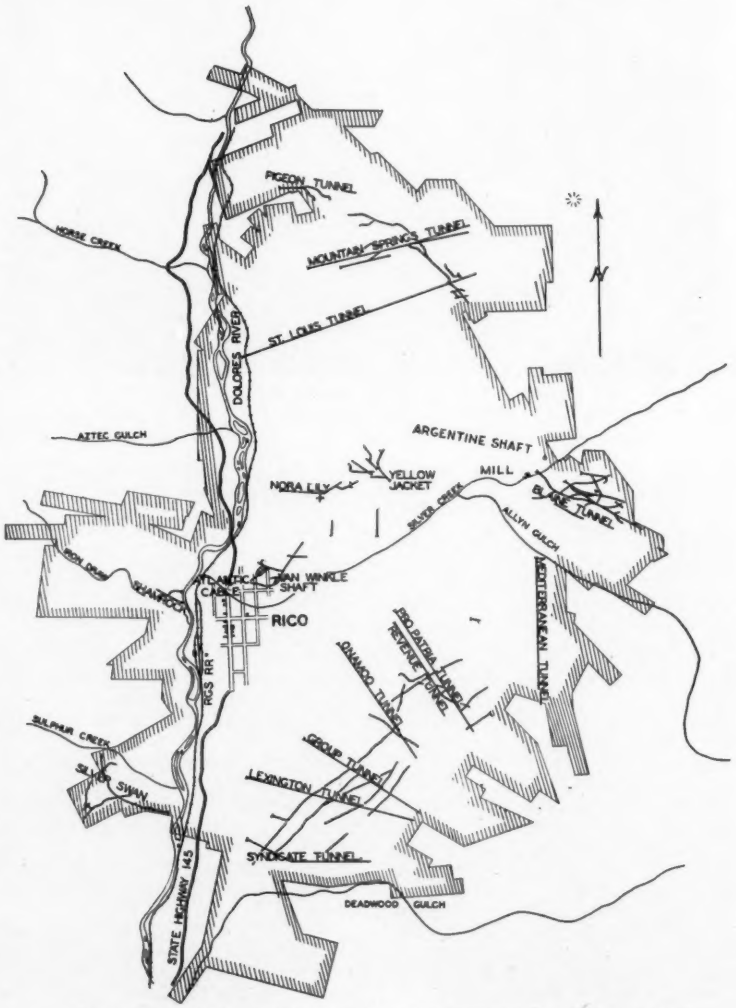
The Rico Argentine Mining Company operates three producing mines in the Pioneer District; the Rico Argentine mine at the base of Blackhawk Mountain; the Van Winkle Shaft, under the Rico Townsite area, with connections to the old Atlantic Cable mine; and the Pro Patria and Revenue Tunnels on Newman Hill.

In addition to these three producing mines, the Rico Argentine is reopening the Mountain Springs mine and the St. Louis Tunnel, on C. H. C. Hill, to resume production from the limestone replacement deposits of the middle Hermosa formation. The company is also driving the Larsen Tunnel into the base of Nigger Baby Hill to prospect the middle Hermosa in that area. The Larsen Tunnel is now into the hill 1,600 ft., and is expected to penetrate the lower limestone beds of the middle Hermosa in the near future.

Ore Found Largely in Limestone

The Rico Argentine mine derives its production from galena-sphalerite replacement deposits in the massive limestones of the middle Hermosa formation, of Pennsylvanian age. Ore deposits have been localized by fissures traversing the limestones, which have provided channels for mineralizing solutions, although themselves only sparingly mineralized. The Van Winkle Shaft ores are similar replacements in the Ouray limestone, which is a single marbleized limestone bed of Devonian age, 150 to 200 ft. in thickness. Ore deposits in the Ouray are localized by small fault-fissures traversing limestone conglomerate in the upper portion of the formation. Pro Patria and Revenue Tunnel production is from quartz veins in the sandstones and shales of the lower Hermosa formation. Locally, replacement ore bodies of limited extent are formed in a thin shale bed known as "the contact," and a thin limestone bed known as the "short lime." Veins are narrow, so production is small, but the ore is often high in silver in the Pro Patria area.

Mineralization of the limestone replacement ore bodies of the middle Hermosa consists of galena, sphalerite (marmatite), pyrite and small amounts of chalcopyrite. Dark gray to black limestone is locally leached white to light gray by mineralizing solutions. Mineralization in the Ouray is similar, but sulphides are accompanied by varying amounts of specu-



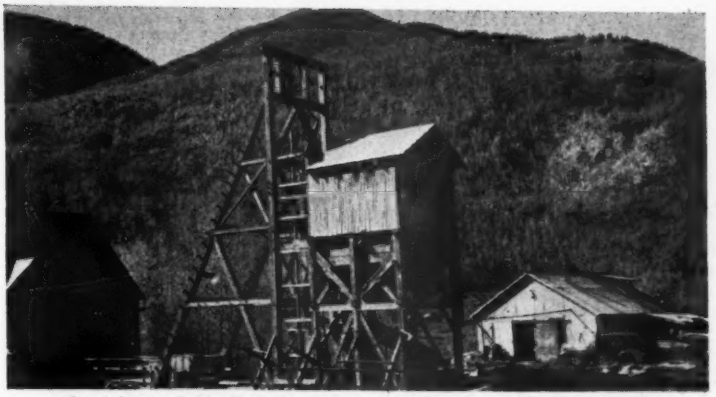
The Pioneer mining district. Rico Argentine properties in shaded outline

larite and magnetite. Mineralizing solutions in the Ouray limestone conglomerate have altered the siliceous matrix of the conglomerate to an earthy and friable material, seriously weakening the mine workings in the vicinity of ore deposition. Pro Patria and Revenue veins carry sphalerite (rosin zinc), galena, chalcopyrite, and occasionally some tetrahedrite or argentite, associated with quartz and chalcopyrite gangue.

Both Gravity and Slushing Methods Employed

Replacement ore bodies in the Rico mines are irregular in outline, vary in thickness from two to 20 ft., and dip at angles varying from flat to vertical, although 30 to 40-degree dip is usual. These irregular deposits are mined by breast stoping up or down the dip from the chute, taking the hanging-wall of the ore body first. Backs of massive limestones or sandstone stand well, and are supported in wide stopes by pillars. In weak ground stopes are supported by pillars and random stulling.

Where an ore shoot is cut by a development crosscut, stoping is normally started up the dip through an open incline raise. Broken ore is moved into the heading by gravity or slusher, depending on the dip of the ore shoot. In many cases it has been found to be cheaper to pick up ore from the floor of the drift than to build chutes. Loading slides are used with 20 H. P. electric slushers for loading cars in the haulage drifts from open underhand stopes.



The Atlantic Cable Shaft headframe, hoist house and blacksmith shop

Two typical ore body and slusher set-ups are shown in Plate 1. Irregularity of mineralization makes prediction of the downward extension difficult, and narrow ore streaks are often stoped underhand, so as not to lose the ore body.

Small double-drum air slusher hoists, rated at 850 lbs. cable pull at 125 ft. per minute cable speed, are used with 26-in. scraper buckets for small stopes and downhill scraping. For larger stopes or uphill slushing, electric double-drum scraper hoists of 15 and 20 H. P. are used with 36 and 42-in. 737-lb. scraper buckets complete with 164-lb. back weights. A full 36-in. bucket will carry about eight cu. ft. of ore up a 35-degree incline.

All development headings are loaded out with Gardner-Denver GD-9 loaders. No hand mucking is done either in haulage headings or stopes except for cleaning track and other minor jobs. It has been found that one mucking machine can handle about four to five headings, depending upon the distance between headings and other factors. Use of mucking machines has enabled contract miners in development headings to muck out and drill in the same shift. At present, seven GD-9 loaders are in use in the various mines operated or being reopened by the company.

Mule and Electricity—Both Are Used

Mancha Little Trammer battery locomotives are in use on all the main haulage levels; the Blaine Tunnel, Pro Patria Tunnel, Van Winkle Shaft first level, and the St. Louis Tunnel.

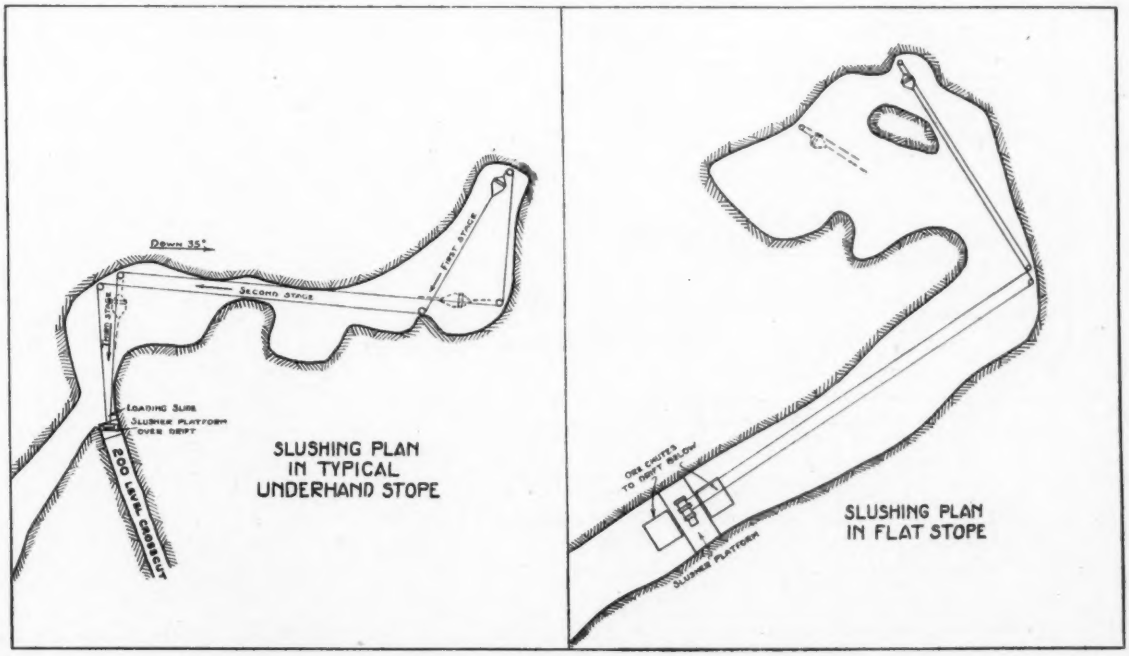


Figure 1

A mine mule serves the Larsen Tunnel (see cut). Cars used are 27 cu. ft.; main haulage track is of 30-lb. rail, at 20-in. gauge.

Ore from the Rico Argentine mine is delivered direct from the Blaine Tunnel, which is the main haulage level, to the mill crusher bin. Ore from the Van Winkle Shaft, which is in the Rico townsite, is hauled uphill to the surface bin near the Rico Argentine mill by truck, average about five tons per truckload, maximum grade 14 per cent, at a contract cost of 35 cents per ton, total haul 1.2 miles. Ore from the Pro Patria and Revenue Tunnels, on Newman Hill, is transported by aerial tramway to the Argentine road, and by truck 0.9 mile to the Rico Argentine surface bin; contract trucking cost 30 cents per ton. Lead and zinc concentrates are hauled by contract trucker two miles downhill from the mill to the R.G.S.R.R. loading ramp, and loaded in 25-ton boxcars at a cost of 76 cents per ton. Ore from the Rico Argentine surface bin is delivered to the mill crusher bin by the Blaine Tunnel trip.

For several months the company has been maintaining a development program of 1,000 ft. per month, and at present their force is divided with 90 men on development and 110 men on mining and milling. In addition, about 400 ft. of diamond drilling exploration is being driven each month —the company owning its own drill and doing its own diamond drilling. The company operates one Sullivan No. 12 air-powered diamond drill for prospecting.

Milling Operation Highly Efficient

The Rico Argentine Mill makes a lead-zinc separation on 120 tons of ore daily. Since the opening of the mill in 1939 it has operated continuously and has required no major alteration of the original flow sheet during seven years of operation. The mill flow sheet is shown on Fig. 2. Average metallurgical results for a typical month are as follows:

	Lead %	Zinc %
Heads	7.3	14.7
Conc.	64.7	54.7
Tails	.5	.9
Extraction (conc.) Lead	93.8%	89.5%

Reagents used:

Lead circuit: Z-6, 0.12 lb. per ton; santosite, 0.40 lb. per ton; NaCN, 0.50 lb. per ton; shell carbonal, 0.12 lb. per ton; $ZnSO_4$, 1.28 lbs. per ton.

Zinc circuit: $Ca(OH)_2$, 4.0 lbs. per ton; Z-6, 15.0 lbs. per ton; $CuSO_4$, 1.35 lbs. per ton.

Zinc minerals are predominately marmatitic. Assays of pure crystals of marmatite from various portions of ore bodies show Fe. values ranging from 6 to 14 per cent. This basically marmatitic character of zinc ores is reflected in the grade of zinc concentrates produced. Heads average about 22 per cent Fe.

During 1945, 35,796 dry tons of ore were mined and milled, producing:

Gold (oz.)	171
Silver (oz.)	164,446
Lead (lbs.)	5,098,806
Zinc (lbs.)	9,214,971
Copper (lbs.)	213,374

Conventional and routine sampling and assaying in the well-equipped assay laboratory is available at the property. Timber is cut from adjacent land and finished for mine use in the company's sawmill at the mine. A stockpile of about 50,000 board ft. of lumber and mine timber is being maintained.

The following table includes all the ore mined and milled by the company since the mill was completed in 1939. The total production of ore amounted to 218,966 tons and the gross value of the concentrates, including bonus, amounted to $5,613,253.18, from which was deducted $1,267,525.96 treatment charges and $618,850.24 freight, leaving a net return of $3,726,876.98. Of this latter amount a total bonus of $655,166.59 was received in premium payments from the Metals Reserve.

From the organization of the present company in 1911 to 1939, when

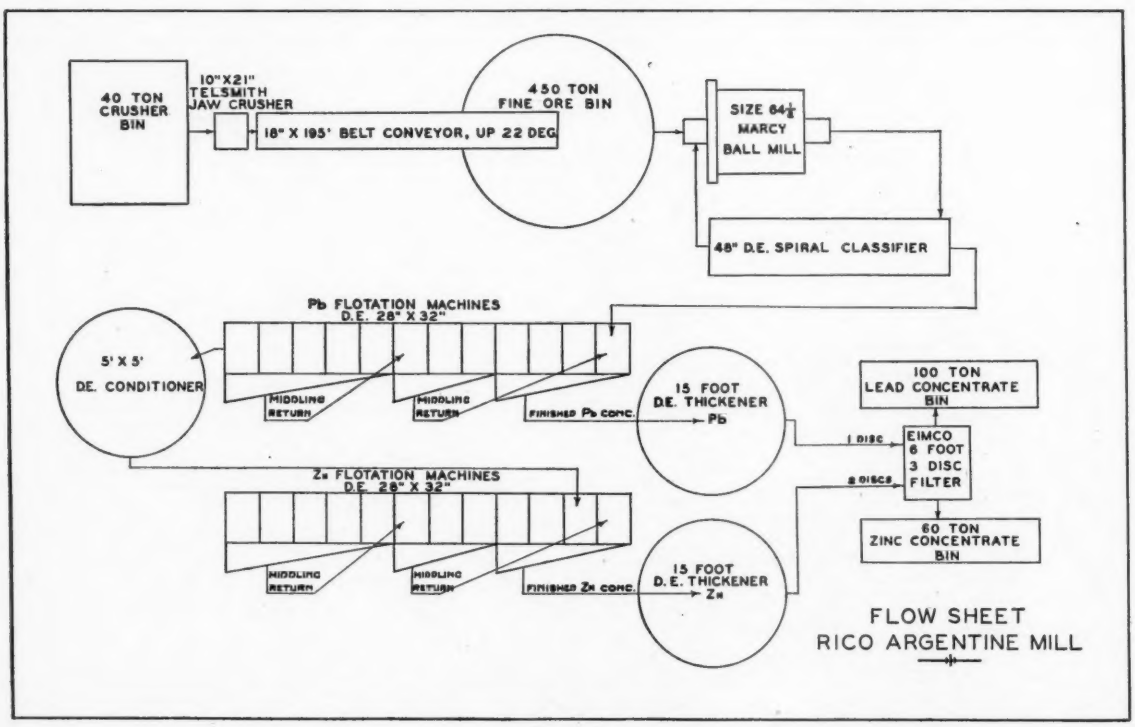


Figure 2

AVERAGE HEADS FOR YEARS 1939 TO 1945, INCLUSIVE

Year	Tons Crude Ore Milled Copper	Lead-Zinc	Average Assay Gold oz.	Silver oz.	Lead %	Zinc %	Copper %
1939	....	10,673	.012	3.83	8.46	11.23	1.06
1939	7,895	.....	.02	7.02	1.00	1.45	4.97
1940	....	23,824	.015	4.25	7.45	10.29	.84
1941	....	35,720	.001	3.60	8.3	10.4	.25
1942	....	34,735	.001	3.66	7.85	10.47	.18
1943	....	33,765	Tr.	5.81	10.23	15.94	.26
1944	....	36,558	Tr.	5.16	9.86	17.2	.28
1945	....	35,796	Tr.	4.885	7.779	14.77	.18

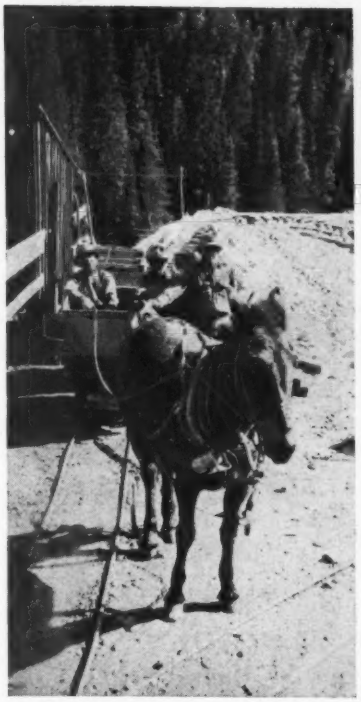
the mill was completed, dividends of $110,739.90 were paid. Since 1939 dividends have amounted to $222,000.

Conclusions

The success in the revival of an old mining district appears to lie in the solution of the geological problems. In 1937 there was very little or no ore in sight in the few small operations or abandoned properties in the Pioneer District. Mr. Van Winkle commenced a development campaign which was carried on for two years during which time no ore was extracted. Persistent application to the geological problems involved, coordinating the information available in the surrounding properties, resulted in the opening up of ore bodies that have kept the mine in constant operation for seven years. In the case of Rico Argentine these problems were baffling. The resultant ore bodies are the best evidence of a proper solution.

The reader may ask, "What are the distinctive features of the Rico Argentine development?" There is nothing spectacular in the application of sound mining and milling practices to large beds of good grade sulfide ore carrying 12 per cent zinc and 8 per cent lead with 4½ oz. silver. There is no glamour in the numerous tunnels, its three shallow shafts, of not more than 350-ft. depth, its three tramways, nor in the modern mining tools such as slushers, muckers, compressors, drills, electric trammers and other items too numerous to mention. A seven-year continuous run of this efficient mill is more or less routine and may be equaled but not bettered elsewhere.

The Blackhawk fissure is one of the important mineralizing channels



Navajo Indians tram by mule at the Larsen Tunnel, a relic of by-gone days

Navajo Indians Make Good Miners

Again you may ask, "What is distinctive about Rico Argentine?" These operations have been carried on during the past two years of the war by the help of Indians. Of a payroll of 200 men, half of them are full-blooded Navajos and the management says that, after a short training, they are good miners. They receive equal pay with the other miners.

The town of Rico, Colo., has a population of 500 and the company is the largest taxpayer in Dolores County. During the war years the company has found it necessary to give assistance to the community in various ways to retain the teachers in the public schools at Rico, to maintain a substitute deputy treasurer to collect taxes, and a deputy sheriff to maintain order. Among its extra curricular activities the company operates a restaurant and the local telephone company in the town of Rico, which is situated in a most beautiful setting on the western slopes of the San Juan Mountains, 9,000 ft. high in the Colorado Rockies. Evidently there is more involved in making a mine than mere mining.

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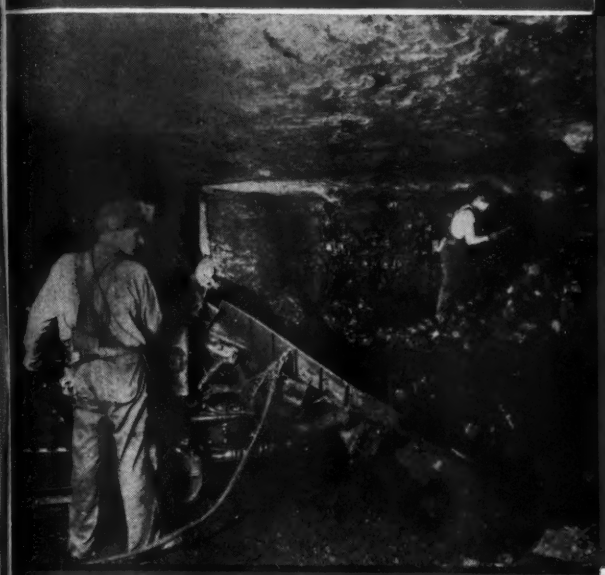

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Courtesy U. S. Bureau of Mines

The foremen's meeting, where troubles are threshed out

Industrial Relations and Safety

By C. J. FLIPPEN
Labor Commissioner
Kanawaha Coal Operators' Association

Safety results essentially from good management, and good management is an art. No supervisor can afford to ignore factors which influence the most complex of all machines—man. The key to successful operation lies in satisfactory industrial relations and when such harmony exists, it is not difficult to bring about safety consciousness throughout an organization.

THERE is a direct and definite relationship between safety and industrial relations, but while good relations will not alone make safety possible, we rarely see a good safety record without excellent cooperation and understanding between management and men. All of us have observed the difference between good and bad management and have perhaps made comparisons, odious and otherwise, publicly or privately, and have wondered at motives and mechanisms which induced good and bad results. We have noticed how smoothly some units of labor organizations get along with management while others appear to always be in trouble, or on the verge of trouble.

Presented before the Big Sandy Elkhorn Coal Mining Institute, Pikeville, Ky., January 24, 1947.

Suspicion of motives from both management and employes is the cause of much misunderstanding, labor trouble, and inefficiency in both production and safety. Mutual good will cannot exist where there is suspicion.

Always, in case of failure, a great many questions suggest themselves and these must be correctly answered before success is assured; this is true of any undertaking. How do we know when we get the right answers? We know by the improved record of efficiency in production; by harmony in the organization; by a good safety record; by increased mutual respect and cooperation in a common effort.

It is evident that all of the difficulties we have in our mines or organizations are not confined to those we have with the Grievance Committee from the local union. There are friction points within management itself, and these cause many of the grievances brought up by the miners. Reflection will convince us that this is true.

Difficulties Not Confined to Subordinates

We have difficulties with superiors, as well as with subordinates and associates. This friction can spread, become contagious, and finally, become a bone of contention with the employes. Each foreman has loyalties and antagonisms among his men and certain of these men will take sides when the friction is recognized among the members of management. It behooves management to be circumspect in this respect. The shrewd labor leader will often take advantage of such a situation by pressing claims he would not have thought about in a harmonious organization. Discord never helps the safety effort —or for that matter, any effort.

It is the duty—pleasant or unpleasant—of the higher management, to organize the will of the group of employes, consisting of superintendents, mine foremen, supervisors, skilled men and ordinary labor, into a cohesive harmonious, loyal, hard-working and efficient gang or team. This work is never done, but is a day to day, month to month, and year to year proposition. It is a full-time job and anyone who thinks he can make an occasional spurt in this direction, then rest on his laurels, is due for a fall. Anyone in higher management who thinks he can pursue a private vendetta, caused by jealousy or revenge, will soon find out that something is wrong in his organization. He will have some misses in his motor.

Friction—Its Causes

In dealing with friction in any organization between the superior and his subordinate, we find two elements of difficulty: the degree of complexity and the restrictions of time allowed for the solution of the problem. For this reason the solution of both problems mentioned will require training and experience. An error in solving the complexity quickly, or not solving it in a short time, may cause the news to spread in the group which in turn may cause loss of confidence and morale, or even a strike. The superior should prepare himself for emergencies because he knows they are coming sooner or later, and in this, training and some experience are necessary.

The complaints we receive, as superiors, are often induced by a sense of injustice, fear, hatred, jealousy, or class consciousness, and just as often are baseless in fact, but if we try to curb the employe from making the complaint we often make matters worse. The man must be allowed to make the complaint—to present his grievance or what he thinks is a grievance. One of the most important things to the complainant is for him to feel that his superior is receptive, but there is danger of overdoing this and causing a flood of complaints. We should get the facts and motives which caused the complaint and endeavor to get the confidence of the person making the complaint; the problem should be resolved at the earliest moment compatible with order and reason. Handling a complaint properly when it is first presented is the reason for many companies being practically free from labor relation trouble.

All of the friction points which we may find between the superior and the subordinate cannot be covered but a few can be discussed individually.

Stubbornness

We often encounter stubbornness, in which case we should find the reason and make the approach so that more stubbornness is not aroused; then try to appeal to reason.

Discourtesy

It is my considered opinion that no organization can function properly with discourtesy from subordinates toward its officials, however, the attitude of the officials very often determines the amount of courtesy exhibited. Discourtesy often comes from persons with low intelligence, but whom we are compelled to meet at the conference table through bargaining contracts. Unfortunately, the brainy man in a group is not always elected its representative.

Disloyalty

Loyalty to truth and justice is more to be desired than loyalty to a single person. The interpretation put on this word by some executives is silly —as when they claim that a subordinate who does not go all of the way and all-out for everything they want, is disloyal. We should be very careful in defining this word—loyalty, because all employes who disagree with us are not disloyal.

Courtesy U. S. Bureau of Mines

Safety—a reminder must be before the men at all times

Fear and Worry

Fear and worry are often caused by uncertainty. This indicates that uncertainties in the organization should be reduced as far as possible. A feeling of security in one's job or associates is a morale builder and reduces the number of complaints. It is our duty to let a subordinate know where he stands with us.

Irresponsibility

In dealing with this we must realize that responsibility is something which is cultivated and is not born in a man. We can, by proper methods, educate this quality in the young, when they will accept the training, but discipline is called for in older persons.

Unreliability

This may be caused by hangovers, bad health, worry, family trouble or any number of incidents not related to laziness. In my opinion this is one of the most difficult things we have to contend with in our relations with men. Improper home training in the young is the cause of many of the young men being unreliable, and about the only thing we can do is to try to make the right impression on the mind of the employe, and if we can't, to let someone else have him. An unreliable man can never be trusted with a responsible job.

Dullness

Occasionally we come across an exceedingly dull fellow who cannot seem to learn or do anything correctly. If we find him in the organization we have to try to cooperate and get some work out of him. Criticism will not help in a case like this and we cannot hope to educate him since he lacks the capacity to learn. We should not try to force too many new ideas; have patience and hope for the best.

Lack of Initiative

Lack of initiative is not always the cause of weakness in the subordinate. If we have this trouble, it would be well to look to ourselves for the cause first of all before making criticism. We inspire initiative by our own actions but we can stifle it just as easily. A subordinate must have incentive before we can expect him to show initiative.

Timekeeping

We can avoid difficulties over wages by *paying the scale and keeping correct time.* We should keep ourselves advised as to what the scale calls for and then pay it. Not paying correctly is the greatest single source of difficulty at some mines.

Contract Interpretations

Difficulties over the correct interpretation of labor contracts are numerous, but we should always study grievances carefully before making the charge that the man making the grievance is an agitator and a radical. He may be (many are), but many more are sincere in making outlandish complaints, either because they cannot understand their meaning or because they have been led by unprincipled leaders who shrug off responsibility. It requires a high degree of self-control and patience at times to listen to some modern grievances but we have to exercise these qualities.

I want it clearly understood that nothing in the foregoing is meant that the superior ever gains anything by a policy of appeasement. He should never give away anything which is not earned or provided by contract unless it is thoroughly understood that it is a bonus or prize, given for outstanding service, over and above the call of duty. The kind of management which appeases usually has more trouble and difficulties with labor than one which stays strictly within the provisions of the contract, pays the exact scale called for, and inflicts discipline when it is provided and needed.

Difficulties with Associates

This is not a discussion on "How to Win Friends and Influence People," but we must get along with our associates. Those of equal rank in an organization often have trouble with each other, and if carried up to the higher management, all may lose something.

The New Foreman

The new foreman coming in from another organization may experience coolness and even hostility from the old guard. This feeling may be worse if the foremen who have spent some time in the employment of the company feel that one of their number has been passed up for promotion. The new man should remember that some of this feeling is always present to some extent and make allowances for it. The old foremen should try to make the new man feel welcome and help him to get started.

Opposition From Another Foreman

Any foreman may meet with opposition from another foreman, and this is sometimes underhanded. It may be in the form of back-door criticism, magnifying errors, or a deliberate attempt to gain favor of the boss by underground methods at the expense of others. This sort of thing should be ignored if possible. We can very well use the energy expended in fighting to building up our own record. Reward is not always sure, but it is good policy to take the chance.

Competition

Where competition between departments or sections is inordinately high, or where opportunities for advancement are rare, we may find some foremen who give too much time to establishing personal influence with those superiors in higher management. This is known as plant politics and should be avoided like poison, although it is sometimes difficult to resist getting involved, especially if the foremen have a political background.

Cliques

There may be a small clique or pressure group which has invited us to membership and whose members are ambitious to gain more favor through pressure and politics from the higher management. The only person in the organization who can handle a situation like this is the boss.

Worry or Fatigue

Difficulties between foremen caused indirectly by worry or fatigue are common and these have definite effects on personality. We should strive to distinguish between rational and irrational conduct and make due allowances for the latter.

Doubt as to Who Is Boss

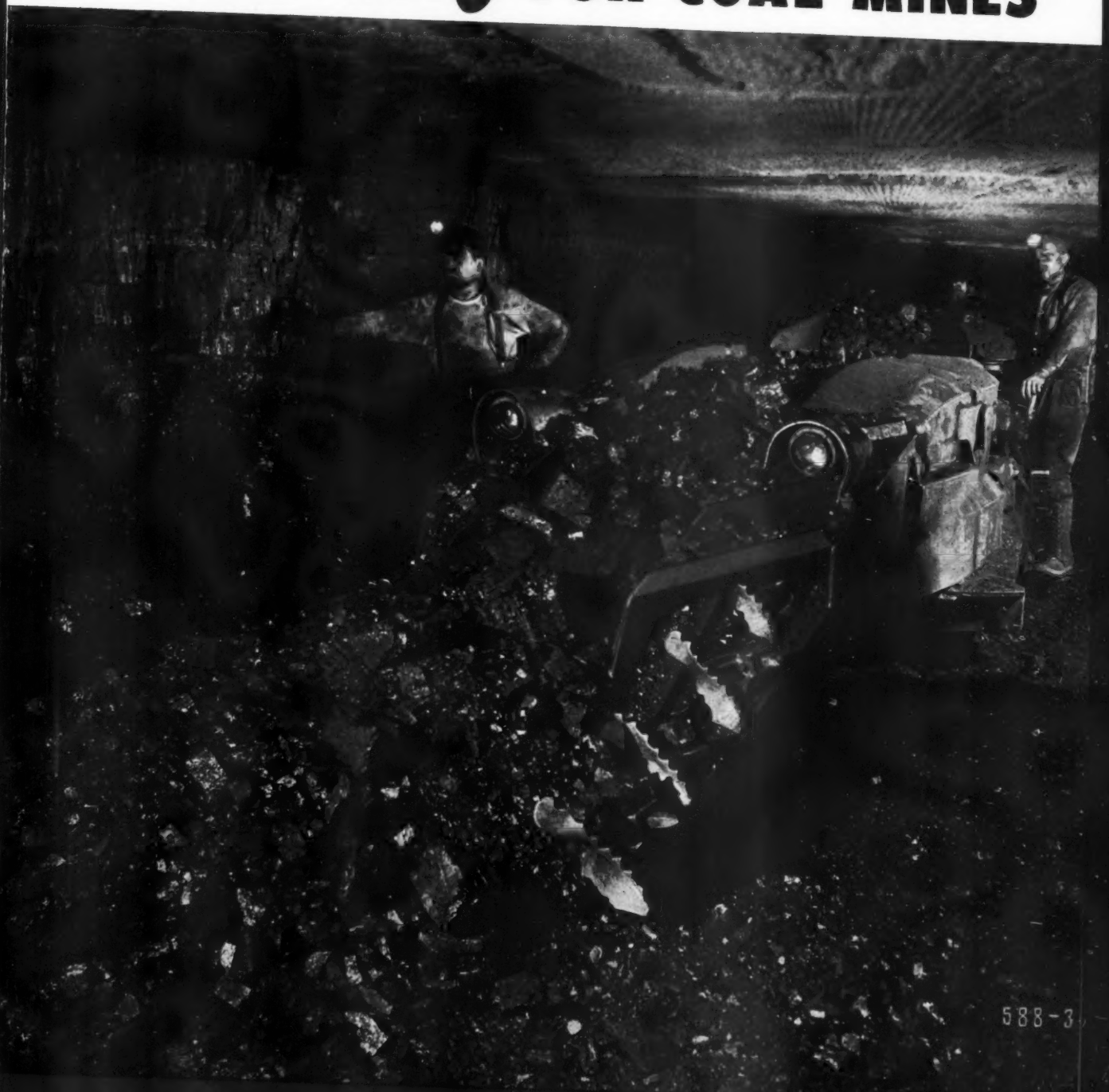
The good foreman does not have to mount a soap box to proclaim who is boss. If he is a good one everybody knows it. When one foreman lets down, the others have to carry his part of the load, morale is weakened, efficiency goes down and costs go up.

Getting Along with the Boss

This is absolutely necessary if we expect to remain on the payroll, and it is often a losing proposition to have serious difficulties with him. No two are alike and when we change jobs or get another boss, we must adapt ourselves to new conditions of employment. In this, I do not think we should be expected to cultivate *unthinking* obedience at all times, but we must carry out orders if we are to remain a part of management, be appreciated by the boss, and have the respect of the men under our supervision. This does not mean that we cannot or should not differ with our superior on methods and means, but if we differ we should use the best tact we can muster and make it plain that we will carry out orders if told to do so. Any foreman who is not allowed to offer suggestions on methods has my sympathy. One way of using tact in discussing what we may consider an impossible order, is to ask that the order be clarified as we do not thoroughly understand it. In this way we can usually get our suggestions before the boss. Little, if anything, is ever gained by appealing to a higher official, even if we think the order issued is asinine and against the welfare of the company, or will make us look ridiculous.

Jeffrey

EQUIPMENT FOR COAL MINES



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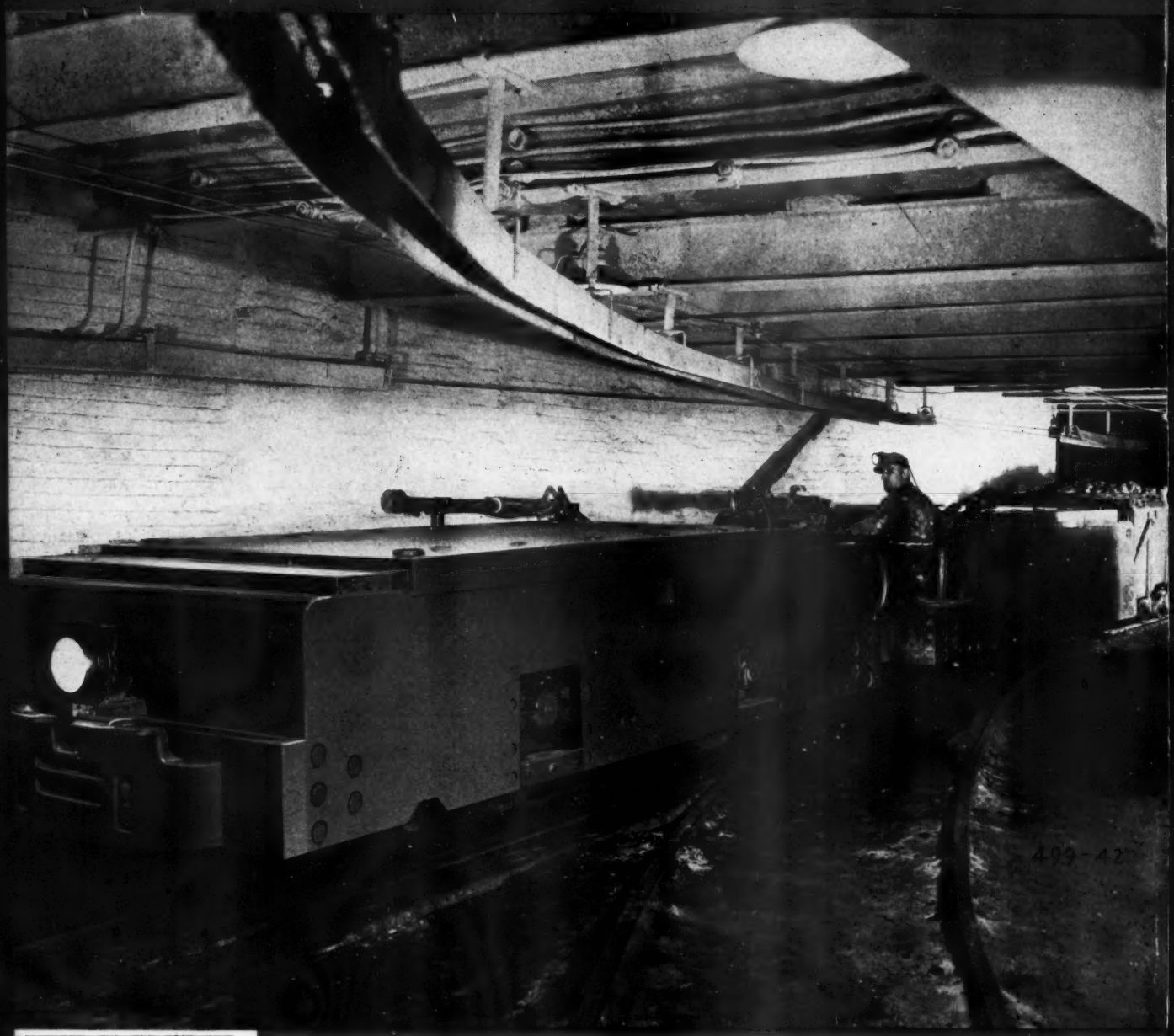

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It has been said that when a supervisor accepts a job, he automatically wins new rights and benefits. He also takes on more responsibilities. He is usually paid more for the added responsibilities and is willing to bet that he can carry them and be rewarded with more pay, more prestige, and a better opportunity for further advancement.

Inability to Get Prompt Decisions

When a problem is passed on to a superior for decision—when it is his decision that must be made, and the men working under us are waiting for the result, serious difficulties arise when we cannot get the decision promptly. When we have laid the proposition before the boss, we have discharged our responsibility to the limit of our authority and should be slow in criticism because we do not know the difficulties involved. Some officials are naturally slow in making decisions, others may have to take matters up higher, while others do not appear to care, but if we have done all we can we should not worry overmuch. Certain decisions can only be made by the boss and what appears to us as undue delay in action should be borne with patience and understanding of his responsibilities and duties.

Lack of Access to the Boss

Some supervisors have this difficulty, and in this case we should determine for ourselves whether we are getting our full share of the time he has to spare for those of equal rank, and if not, the fault may be with us.

Responsibility and Authority

Possibly more difficulties arise from not having an exact determination of the scope of authority and responsibility than from any other cause in the relations a supervisor has with his boss. The subordinate should be fully informed as to the extent of his responsibility and be accorded authority covering the responsibility he is given. If we do not know the line of demarkation, we come to the point where we do not know what to do and confusion results. This matter has never received the attention it deserves and is the direct cause of many breakdowns in management, labor trouble, bad safety records, poor supervision and low morale.

Emergency Decisions

All of us realize that emergency decisions are necessary at times. Often the supervisor cannot ask his superior what to do and must make an immediate decision. We may have to act so promptly that we do not have a chance to study the problem, and for that reason, we sometimes make mistakes in judgment. I used to know a superior who would ask, "Where the hell did you get the authority to do that" when a mistake was made in some such situations and did not turn out well. All I can say on this is, that if we have done the very best we knew how, we owe no apology to the boss for making a dumb play. It is his duty to know whether we are smart or dumb—and his responsibility in picking us.

The Superior's Attitude and Safety

The attitude of the superior toward his subordinate has a great deal to do with whether we have confidence in him or the job we are doing; whether the subordinate is loyal and efficient or whether just merely fair. Most of the difficulties the subordinate has with his superior can only be resolved by the latter.

What has this to do with safety in the mines?

Safety consciousness is built up gradually, sometimes over a period of years and requires harmony and cooperation in all of the supervisors and officials before there is confidence enough to beget a consciousness of the need of safety thinking at all times—not once a week, but all of the time. If the miner sees a rift in the relations between the members of the official family or thinks he has been left out of what he thinks he should have—if he does not understand the deal he gets from his boss, he is dissatisfied and his morale disintegrates.

It is not very difficult to bring about safety consciousness in an organization, provided harmony prevails and outside influences are not having a detrimental effect, but even with the outside influences working against us—which are beyond our control—it is not impossible to bring about safety consciousness, provided we have 100 per cent cooperation from the higher management and all of us know what we are supposed to do.

Courtesy U. S. Bureau of Mines.

Truck Haulage Castle Dome Open Pit

By B. R. COIL
General Superintendent
Miami Copper Company

There are lessons to be learned from the mining of open cut properties under emergency wartime conditions. The necessity for speed, coupled with requirements for a minimum of equipment outlay, has in many cases resulted in unusually efficient and economical operation. The Castle Dome property is an example of such an enterprise. In this case, the flexibility of truck haulage made possible the use of a low-grade copper deposit that might have remained unmined during the war years.

THE Castle Dome Copper Co., Inc., operates an open pit mine and concentrator located about nine and one-half miles west of Miami, Gila County, Ariz. The terrain is extremely rugged, typical of the Pinal Mountains. The elevation at the shops is 4,350 ft. and the Dome proper originally rose to 4,830 ft. above sea level. Average rainfall is around 19 in. per year, generally falling in the months of December, January, February, July and August. There is an occasional snowfall during the winter months.

The nearest railroad is located at Miami and all supplies must be transported 10 miles. Concentrates are hauled 9 miles and loaded into railroad cars for switching to the nearby International Smelting and Mining Company's smelter. There are 10 houses on the property for officials who are on 24-hour call duty, but all other employes live in Globe, Miami, and communities between these two towns. A subsidiary company operates a bus line from Globe through Miami to Castle Dome and transportation is furnished employes at a nominal cost.

Several stringers of copper ore were discovered by the early prospectors, but practically no development work was done prior to 1920. During the early 1920's and continuing until the depression of the 30's, the property was owned by the Pinto Valley Development Co., and some churn drilling was done. This company determined that there was a very small tonnage of ore of plus 1 per cent copper, and they were never able to justify an underground mine and concentrator. Toward the end of the Pinto Valley development, some work was done in cooperation with the U. S. Bureau of Mines on ferric sulfate leaching, exploring the possibility of leaching the low-grade copper, either

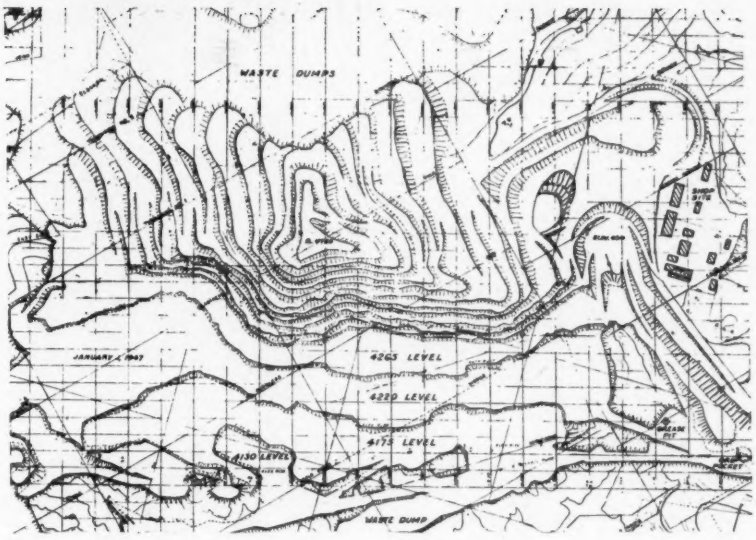
in place, or in heaps, or in a combination of the two methods.

War Emergency Hastened Development of Property

Miami Copper Company obtained the property and began a churn drilling program in 1940 with the idea of developing ore for future reserves. With the advent of World War II, and the resultant copper shortage, the Defense Plant Corporation became interested in the deposit and decided to develop it as a complete unit. Defense Plant Corporation did the preliminary stripping and built the plant and facilities which it owns. Castle Dome Copper Co., Inc., owns the ore body and operates the plant on a royalty basis, as a leasee. Miami Copper Company organized the Castle Dome Copper Co., Inc., a wholly-owned subsidiary, to operate the mine and plant. This company functions as a separate unit except that top management is the same for both companies.

Mine stripping and construction of the plant and facilities were done by the W. A. Bechtel Co., as engineer-contractors for the Defense Plant Corporation. Speed was the guiding factor and records were set all through the construction. Work was begun in January, 1942, and the plant began producing copper June 10, 1943.

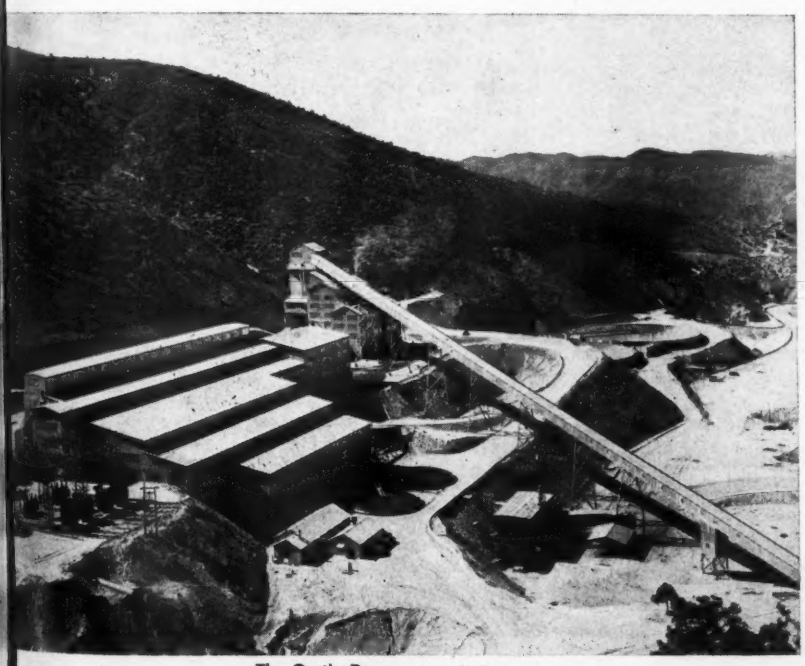
Access was gained by building a four-mile road starting from Highway 60-70 at a point five and one-half miles west of Miami, and branching on the property, one branch going to the concentrator and the other going to the mine and shop site. This road was constructed to highway specifications, the maximum grade being 8 per cent, and after the heavy machinery was hauled in, the road was paved with plant-mix black top. Secondary roads were built to the tailings dam, campsite, and other locations. 15,415,907 tons of waste material had been removed from the upper levels of the Dome by the time the concentrator began operations, June 10, 1943.



General plan of Castle Dome operation

Deposit Typical of Low-Grade Porphyry Coppers

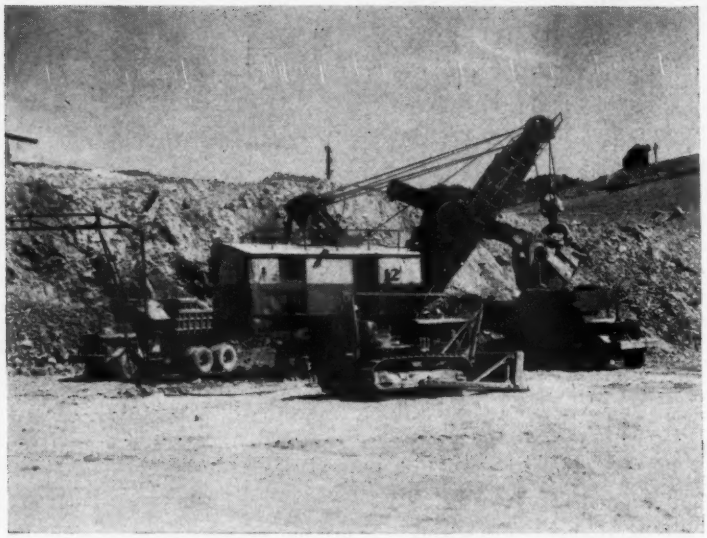
The ore body lies on the south face of Castle Dome Mountain, with the predominate rocks being quartz monzonite and quartz monzonite porphyry of Pre-Cambrian Age. Both chalcocite and chalcopyrite are present. Secondary enrichment has formed a blanket-like ore body roughly parallel to the surface of the mountain which slopes approximately 45 degrees. The ore body is overlain with from 60 ft. to 100 ft. of leached capping. It has a maximum length of 3,300 ft. and an average width of 500 ft. measured in the plane of a working bench, and a maximum thickness of 385 ft. measured from the top bench or level to the bottom level. The deposit contained an estimated 29 million tons, assaying an estimated 0.741 per cent total copper. Mining is complicated by large and small bodies of included waste, and the two bottom levels are divided into an east ore body and a west ore body by a large horse of waste near the center of the mine. An ore cut-off is made at 0.40 per cent sulfide copper, and the boundaries of the ore body are determined by this cut-off.



The Castle Dome concentrator

Ore Moves Both Down and Up Hill

Stripping consisted of stepping the south side of the Dome in 40-ft. benches so there would be a 45-degree overall backslope from the bottom of the ore body to the top of the mountain. Benches were carried around the Dome and the waste material was dumped on the north side. Above the 4,470-ft. level, waste moved



Ordinarily five trucks are required per shovel

either east or west depending on which haul was shorter. A saddle joined the Dome on the east at the 4,470 level and all waste below this elevation had to be hauled around the west side of the Dome.

Ore is hauled east to a chute and pocket above the primary crusher 800 ft. east of the east pit limit. Dumping blocks were located at the following elevations: 4,232, 4,265, and 4,205. Approximately half of the ore will move downhill or on a level haul, and half of the ore will move upgrade. Beginning with the 4,065 level the bench height was changed to 45 ft. Ore will be mined on nine levels, the highest being 4,430 ft. elevation; the lowest being 4,085 ft.

The standard cycle of operation is followed. Banks are drilled by 29 T Bucyrus-Erie electrically-operated churn drills using 9-in. bits. Holes are loaded and blasted with No. 3 quarry bag powder or 40 per cent special gelatin dynamite or a combination of both in softer material. In harder material a combination of 70 per cent bag powder and 60 per cent special gelatin dynamite is used. Two lines of plain primacord are used to detonate each hole, and crushed ore (ball mill feed) is now used for stemming. Ore and waste are loaded into 30-ton dump trucks by 4161 Marion electric shovels with 5-cu. yd. buckets.

Mine Has Had Three Operating Stages

1. For the first year operations were set on a schedule of three tons waste to one ton of ore.

2. For the suceeding two years operations were set on a schedule of a 1 : 1 waste to ore ratio.

3. Recently, and continuing today, operations are on a schedule based on 0.33 tons of waste per ton of ore. At the present time the concentrator is handling in excess of 12,000 dry tons per 24 hours. Total mine production of ore and waste is averaging better than the scheduled 16,000 tons per 24 hours. At all times operations have been on a 24 hours per day, seven days per week schedule.

In planning the mining operations it was decided to use truck haulage rather than rail haulage for the following reasons:

1. The small tonnage in the ore body pointed toward trucks because of a smaller capital investment.

2. The mine would be a one-level mine as far as ore production was concerned and truck haulage would be more flexible than rail haulage, especially for handling the included waste.

3. Because of the topography there was available space for waste dumps within a short haul and the average ore haul was within reason for truck operation.

4. Half of the ore would move downhill or level and there would be no drop-cut levels.

Haulage equipment at the Castle Dome mine at the present time consists of the following: Thirteen units, 30-ton truck, Knuckey; four units, 15-ton truck, Euclid.

During the period that operations were on a 3 : 1 waste to ore ratio, we had the following additional equipment: One unit, 30-ton truck, Knuckey; four units, 15-ton truck, Euclid; three units, 30-ton rock buggy pulled by a D-8 cat.

TABLE NO. 1

Operating Data, 30-ton trucks from start of operations to April 30, 1946:

Number of shifts operated	31,324
Total tons hauled	27,694,775
Miles traveled	1,014,292
Average round trip miles	1.07
Tons per shift	884.1
Tons per load	29.1
Trips per shift	30.4
Ton-miles per shift	472.0
Round-trip miles per gallon fuel	1.99
Ton-miles per gallon fuel	29.1

Mileage is based on measured distance figured to nearest .05 mile.

Two Truck Sizes Used

The 30-ton Knuckey truck in use is manufactured by the Knuckey Truck Co., San Francisco, Calif., and is an assembled unit. The truck has two rear axles with dual wheels and tires on each and a single front axle with single wheels and tires, making eight tires under the rear and two tires under the front. Rear tires are 14.00x24 and front tires are 13.00 x24. The truck is powered by a 150 hp. Cummins HB600 diesel engine, and other parts are as follows: Fuller clutch, Fuller transmission, Spicer universal, Spicer Brownlipe auxiliary transmission, Timken rear end, Timken front axle, and Ross cam lever steering gear without boosters.

The 15-ton trucks are Euclids, Model 2FD rated for 15-ton loads, and powered by a 150-hp. Cummins diesel, Model HB600. They are dumped by a hydraulic three-stage double-acting telescopic hoist. There is one axle under the rear with four 14.00x24 tires and two 13.00x24 tires under the front end.

Truck Operation Requires Coordination

The shovels work in the pit so that a truck can be spotted on either side of the shovel. This reduces the arc of shovel swing and allows a truck to be backed into the loading "spot"

TABLE NO. 2

30-Ton Truck Haulage Costs

Based on the period January through April, 1946. These costs do not include a recent wage increase of 18½ cents.

	Cost per ton hauled	% of total cost
Tons hauled 2,980,236		
Operating labor	$0.01377	23.4
Repair labor	0.01167	19.9
Operating supplies	0.00048	0.8
Petroleum products	0.00391	6.7
Tires and tubes	0.01169	19.9
Repair supplies	0.01209	20.6
Road maintenance	0.00514	8.7
	$0.05875	100.0

Jeffrey-Galion (Pty), Ltd.

while the shovel is loading the truck on the other side. Two spotters are used at the shovel, one on each side so there will be no delay. Spotters keep the spot site free of loose rock, direct the driver in backing into the "spot" and remove any rocks that fall in front of the wheels. A dumpman is stationed on each operating dump to guide the drivers and remove rocks.

Keeping enough trucks working at a shovel so the shovel will operate continuously is the ideal condition and the number of trucks required depends on the length of haul. Experience has shown that for our present hauls five trucks are required per shovel. When two or more shovels are working on the same shift, a little advance planning will keep the hauls balanced so that as the haul increases at one shovel requiring an additional truck, the haul will decrease at the other shovel, releasing a truck.

A high grade of skilled driver is required for operating the 30-ton trucks. Needless to say, poor truck drivers can cost a lot of money, not only in the repair bill, but also in the loss of production while the trucks are in the shop. If experienced drivers are not available, drivers are trained on the job. A truck foreman has charge of driver training.

Truck Repair

All truck repairing, including motor overhauling, is done in a three-pit shop located outside the mine area at an elevation of 4,350 ft. The truck shop is under the general supervision of the Master Mechanic and the immediate supervision of the General Shop Foreman who also handles the Ford repair shop, tire shop, cat repair shop and the lubrication department. Under the General Foreman the organization is shown in Table No. 3.

TABLE NO. 3

A Shift

1 shift foreman
4 mechanics
2 helpers
2 apprentices
1 field mechanic
1 mechanic at the grease rack

B Shift

1 shift foreman
2 mechanics
1 field mechanic

C Shift

1 field mechanic

All major repair work, motor overhauls, and the build-up of spare universals, auxiliary transmissions, differentials, etc., is done on "A" shift, and minor and emergency repairs are made on "B" shift.

On each shift, one mechanic works in the mine proper from a pick-up truck. He makes field repairs, replaces chains, adjusts brakes and does other minor jobs to keep the trucks operating. On "A" shift one mechanic is stationed at the grease rack. He inspects, tightens, and makes minor adjustments on each truck while it is being lubricated. This mechanic inspects the cast bottom liners in the dump body to see that all bolts are in place and tight.

Trials of Wartime Operation Were Many

Since the operations were started during the war period, conditions have been abnormal and this has been reflected in increased costs in truck maintenance. Diesel mechanics and truck mechanics have been in demand and it has been necessary to compete against a higher wage scale paid in the war industries. The result was that most of the so-called "mechanics" were poorly qualified and turned out a class of work in line with their qualifications. On-the-job training was established in cooperation with the State Department of Vocational Education for a six-months' period with good results and most of the trained men have stayed on the job. Likewise inexperienced drivers have added their share to increased maintenance costs.

Another factor, resulting in high costs, was a shortage of spare parts. This resulted in reusing old parts, patching and improving which led to recurrence of the same breakdown.

During the first six months of 1946, the main breakdowns causing lost time are shown in table No. 4.

A truck foreman who works on "A" shift acts as the liaison agent between the repair shop and the operating crews. The drivers on "B" and "C" shifts turn in equipment cards noting any repair or adjustment needed on their trucks and the truck foreman sees that these jobs are done. He spends part of each shift driving and inspecting the trucks and sends the trucks to the shop for preventive maintenance. The truck foreman also supervises the concentrate haul and the freight haul and, as previously mentioned, has charge of driver training. The number of standby units required to operate a given number of truck shifts is a question of prime importance. No hard and fast conclusions have been arrived at as there are many conditions affecting the picture.

A truck repair shop is located on the property

While working on the 3 to 1 waste to ore ratio, every haulage unit was scheduled for continuous operation, and as might be expected, this schedule was not maintained. This was an uneconomic operation but the war demand for copper was so great that continuous operation of the concentrator at capacity was the determining factor rather than mine costs.

On the 1 : 1 waste to ore ratio, the schedule called for 10 truck shifts per work shift or 30 truck shifts per 24 hours. With 13 30-ton trucks it was not possible to keep 10 in constant operation and it was necessary to use the 15-ton trucks to fill out the schedule. During the first four months of 1946, the 30-ton trucks had

TABLE NO. 4

Cause	No. of breakdowns	Average No. per month
Brakes	518	86
Hoists	290	48
Tires	241	40
Transmissions	139	23
Fuel systems	124	21
Chains and sprockets	86	14

The 15-ton truck saw extensive use on short hauls

an actual total operating time of 80.7 per cent of the scheduled 30 shifts per day. So with 13 trucks, eight were actually operated continuously. From this experience, it follows that for 24-hour operation with trucks of advanced age, one spare is needed for every two trucks. However, the 80.7 per cent figure included any delay of 10 minutes or more, and in the course of a month would include a great many delays for field adjustments which would occur no matter how many standby trucks were on the job. Eliminating these delays, it is concluded that the figure should be somewhere between one standby for two trucks and one standby for three trucks.

Since operations have been cut to the ⅓ to 1 waste to ore ratio, requiring five truck shifts on "A" shift, ten truck shifts on "B" shift, and five truck shifts on "C" shift, totaling 20 truck shifts per 24 hours, trucks have been available at all times. For June, 1946, the 30-ton trucks had an actual total operating time of 100 per cent of schedule.

Servicing Is Routine Procedure

Trucks are brought to a building near the ore dumps, once each shift for lubrication and servicing. This building contains a pit and is fitted with Alemite pressure grease guns and other equipment for servicing the trucks. The routine is shown in Table 5.

Batteries are serviced once each week on Friday. A record is kept of the consumption of fuel, oil and grease by each individual truck. This record is used as a guide in determining the need for an engine overhaul and other repair work.

The crew in the Lubrication Department is shown in Table 6.

The trucks are fueled on the job by a 2,000-gal. tank truck with metered delivery. There are fuel truck drivers on "A" and "B" shifts and the tank is left filled on "C" shift so the greaseman can issue fuel if necessary. The fuel truck drivers actually spend only a small portion of their time fuelling the dump trucks as they have other assignments. The foreman also supervises the lubrication of other equipment, such as bulldozers, portable compressors, portable welding machines, etc.

TABLE NO. 5

A Shift

1. Check and add when necessary
   a. crankcase
   b. transmission
   c. brownlipe transmission
   d. differential
   e. chain oilers
   f. hoist fluid tank
   g. radiator
   h. tires
2. Complete grease job with pressure gun
3. Change oil in motor every 96 operating hours

B and C Shifts

1. Check and add when necessary
   Crankcase
   Chain oil
   Hoist fluid
   Radiator
   Tires

TABLE NO. 6

A Shift

1 Foreman (supervises all 3 shifts)
2 Greasemen
1 Helper

B Shift

1 Greaseman

C Shift

1 Greaseman

Tires Good for Nearly 10,000 Miles Before Recapping

Tires account for 20 per cent of the cost of operating the dump trucks, and the wartime shortage of tires has been the chief operating worry. During the war years all truck tires were removed while they were suitable for recapping, although it was learned that recapping was not economical on the 14.00x24 rear tires. When these tires are recapped they fail in the side-wall before the new tread is worn off and the cost per mile for recaps is greater than the cost per mile for new tires. However, it was possible to keep the trucks running on recaps when new tires were not available and the extra tire cost offset a larger cost which would have been incurred for idle equipment. Since tires are again available, rear tires are being run until they are ready for the scrap pile.

Mine Furnishes Its Own Road Material

Experience has shown that it pays to keep the haulage roads in good condition and a regular road crew is employed, consisting of one foreman, one blade-grader operator and two dozer operators. This crew spends about 60 per cent of their time on mine roads and the balance on similar work elsewhere about the property.

Inasmuch as the haul roads are on solid rock, experience has shown that the best road is made by filling 18 in. above bench grade. This gives adequate drainage during the winter rainy season and gives the blade operator proper material with which to work. In certain parts of the mine good road building material is encountered, and if not needed at the time encountered it is stockpiled for future use. As shown in Table No. 1, ½ cent per ton mined is spent on building and maintaining roads.

Conclusions

Based on three years' experience with trucks, it is concluded:

1. Trucks make a flexible and satisfactory operation for open pit mining, at Castle Dome Copper Co., Inc.
2. Adequate standby haulage units are necessary for economic operation.
3. There is no substitute for experience and training in connection with heavy truck drivers and mechanics.

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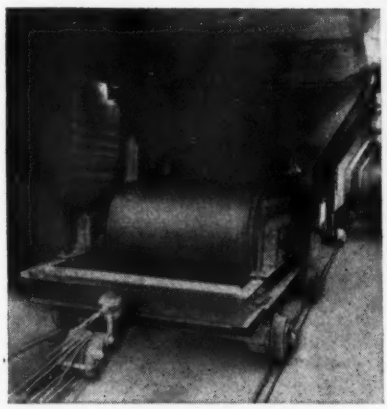

▲ ABOVE: This 54" wide by 422' centers Link-Belt belt conveyor equipment has handled 30,000,000 tons of crushed ore from the No. 2 crushing plant to storage bin.

◀ AT LEFT: This 54" wide Link-Belt traveling belt conveyor equipment under crushers has handled over 35,000,000 tons of ore.

● Here is another record of dependable performance—at the Frood Mine of The International Nickel Company of Canada, Limited, Copper Cliff, Ontario, where Link-Belt belt conveyor equipment handles ore from open pit to storage bins. The above photographs illustrate two of the numerous belt conveyors in service, which have handled millions of tons of ore, efficiently and at low cost—and are daily increasing the tonnage figures.

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What Roof Conditions Permit Pillar Recovery?

Pillar Recovery is Governed by the Nature of the Roof, Rate and Continuity of Mining, and Costs. Roofs That are Extremely Hard and Those That are Extremely Soft Do Not Favor Pillar Recovery—Roof Behavior Must be Judged by Trial and Error

By H. P. GREENWALD
Superintendent, Central Experiment Station
Bureau of Mines
Pittsburgh, Pa.

THE question used as a title for this paper was asked of the writer with the thought that it could be answered without reference to the economics of the situation. This is possible only in a most general way, and it would be better to use the word "favor" instead of "permit." The thesis advanced here is that the possibility of recovering pillars is influenced jointly by the nature of the roof, the rate and continuity of mining, and the economics of the particular instance in hand. Insofar as the roof itself is concerned, one should distinguish between immediate and main roof.

Before any mining in a coal bed, the coal and the strata above and below it are in equilibrium under the force of gravity, plus any latent force that may exist because of strain in the material resulting from forces applied in past geologic ages. As voids ordinarily are negligible, gravity can cause primarily only compression of the strata into a smaller volume. When an entry is driven through the coal a void is created which is enormous in comparison to any that existed prior to mining. Support is removed from the strata forming the immediate roof of the entry, and the stresses in all the strata surrounding the entry are redistributed toward a new equilibrium. If the strata have enough strength to withstand the new distribution, nothing happens and mining goes on without application of artificial supports. In such a case, the immediate roof supports itself as a beam or plate, and the load carried originally by the coal that has been removed is distributed to the pillars on either side of the entry. This redistribution is not instantaneous; it takes time, and if failure of a given stratum results, this failure may not appear for many hours or even days. If the immediate roof will not support itself, artificial supports become necessary varying from occasional posts to close timbering and even lagging as the roof strata change from strong rocks to weak shales or clay.

The Study on Coal Pillar Recovery, started several months ago, is being continued jointly by the Committee on Roof Action and the Committee on Mechanical Loading. The discussion presented here is in the nature of an introduction to the second phase of this study, now under way, which will cover reports on actual recovery methods and show details of how pillars are extracted under various roof conditions.

Removal of pillars increases the voids to the point where both the immediate and main roof are stressed beyond their strength, at times the coal in the pillars is overstressed also. The idea back of American practice is that this overstress will cause collapse of the roof strata into the goaf, which will prevent overloading the pillars, it being commonly recognized that overloaded pillars can be mined only with difficulty, if at all.

Factors Governing Favorable Roof Conditions

It follows that roof conditions most favorable to extraction of pillars are an immediate roof strong enough to remain in place in the immediate vicinity of the mining operations on a pillar, either with or without the application of moderate artificial support, plus a main roof sufficiently weak to break at close intervals as the pillars are removed. From these ideal conditions, there are successive graduations to poorer conditions, with no real dividing lines between them. The economic factor enters here. An immediate roof composed of weak shale or clay may require such extensive support that removal of the pillar becomes unprofitable. On the other hand, there are cases where a massive sandstone stratum in the main roof has great strength and will not break before the pillars are badly overloaded. This condition causes bumps and bursts of coal from the face; it can be overcome by extensive artificial support in the goaf, and here again economics enters.

It is plausible to believe that there is a rate of mining pillars that is most advantageous for any given set of conditions. Rapid extraction favors easy support of immediate roof in many cases. Where the main roof is excessively strong, it may be better to adopt a slower rate and allow time for redistribution of stress that will cause it to collapse. It seems impossible to predict what the most

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favorable rate will be for any given set of conditions. Determination by trial is the indicated procedure.

The Four Types of Roof

When a system of pillar recovery is planned, those in charge will have considerable information on the immediate roof, gleaned from experience with it during the driving of entries and rooms. It will be convenient to regard this roof as divided into four types, delineated roughly by the mechanical strength of the rocks, but without sharp boundaries of separation. These are:

1. Strong rocks that remain in place over long spans without artificial support and that can be broken only with great difficulty.
2. Medium-strong rocks that require little artificial support in entries and rooms and break only when the unsupported area is large and the weight considerable.
3. Medium weak roofs that require moderate timbering in entries and rooms and usually collapse to some extent when the timber is withdrawn.
4. Very weak roofs that require close timbering and even lagging.

The two extremes (types 1 and 4) do not favor extraction of pillars; type 1 puts too much weight on the face, whereas with type 4 the cost of timbering is excessive. Fortunately, roof rocks of types 2 and 3 are far more common, under which, with proper care, pillars can be extracted at a reasonable cost and without undue hazard.

It is inevitable that the official in charge of pillar extraction will pay much more attention to the immediate than to the main roof. The immediate roof can be observed at all times, and things can be done to control its action. The main roof is unknown, except as logs of drillings or shaft sinkings record it, and these may not give reliable data on the strength of any given stratum when subjected to weight over a long unsupported span. There is nothing to be gained by fighting the action of the main roof and attempting to control it. The weight is such that no system of artificial support can prevent its movement; even complete backfilling merely limits that movement and causes it to become more regular and less evident on the surface.

Weak roof adds to the difficulties of pillar recovery

The assumption here is that the main roof will be allowed to break and subside and that this breaking is necessary to prevent overstress in the pillars being mined. The mine official must then accommodate his work to what the main roof will do. He should study its behavior as though it were the proverbial rich uncle whose favor is desired for quite mercenary reasons.

How Much Pillar Coal Can be Taken?

Practical experience in many places has shown the correctness of the foregoing analysis, and there is no reason to expect a great difference in some new venture. There remains one question: How much pillar coal shall be taken and where in the pillar? Here economics enters the picture again but should not obscure the fact that if the pillar is taken at the wrong place insofar as the roof is concerned, serious trouble may result. If the immediate roof is not supported adequately, injury to men and loss of equipment are likely to result. On the other hand, there is grave danger of leaving too much support for the main roof, so that its action is irregular and unpredictable. Once a good initial break of the main roof is established, keep it moving. Extract pillars systematically and at a uniform rate. There is evidence to show that even the customary week-end stoppage of work causes a variation in roof action that is undesirable in most instances, and in some can be downright harmful.

Obviously a method of successful pillar extraction results from trial and error, and success is more likely when there is close observation during the trial and thought concerning the nature of the errors. This approach should be employed more widely.

Strong roof permits large mined areas before caving

Plans for Largest Coal Convention and Exposition Nearing Completion

GEO. H. LOVE
Pittsburgh Consolidation Coal Co.
National Chairman

MECHANIZATION—the route to economic success in the industry—will keynote the four-day discussions of modern coal mining at the 1947 Coal Convention and Exposition, starting Monday, May 12 in Cleveland. To date 174 exhibitors have secured space in the Cleveland Exposition Hall and more reservations are coming in daily. The display will be the largest Exposition of coal mining machinery and equipment ever held.

The Program Committee, composed of operators and manufacturers thoroughly conversant with all the problems of mining, realizes that the trend toward complete mechanization has crystallized into a definite movement affecting the entire industry. Accordingly, the committee has planned an unusually comprehensive agenda of papers for discussion. All

Members—Program Committee

P. F. Bauer
Allis-Chalmers Mfg. Co.

Wm. Beury
Algoma Coal & Coke Co.

A. J. Breitenstein
H. C. Frick Coke Co.

H. V. Brown
Brown-Fayro Co.

Wm. L. Burt
Greenland Coal Co.

C. J. Connelly
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Susquehanna Collieries Co.

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Goodman Mfg. Co.

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Philco Corp., Storage Battery Div.

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Carl T. Hayden
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General Electric Co.

Jas. Hyslop
Hanna Coal Co.

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Jamison Coal & Coke Co.

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major topics of interest to modern coal mining will be covered during the four-day meeting, including recent developments in surface preparation, mechanical loading, strip mining, belt and car haulage, face preparation and accident prevention, as well as labor relations and economics as they affect operating methods.

The opening session Monday morning will deal with subjects of general interest to all branches of the industry. Following this, concurrent sessions will be held to cover the more specialized phases of deep mining and open-pit operations. A new feature to be inaugurated at this convention will be open meetings of the Coal Division Committees, where committee reports will be presented and discussed by all present who are interested in these particular subjects.

Practically every phase of coal mining will be represented in the exhibits. Technical representatives of the manufacturers will be on hand to demonstrate the application of new equipment and to discuss operating problems.

Starting on Monday, May 12, the meeting will last four days, terminating with the annual banquet Thursday evening, May 15.

The April issue of MINING CONGRESS JOURNAL will contain the complete advance program for the meeting, the full list of exhibitors and a brief description of each display.

Those who plan to attend should communicate promptly with Wayne Stetson, Manager, Cleveland Convention and Visitors Bureau, 511 Terminal Tower, Cleveland, Ohio..

Since the Coal Show promises to be bigger than ever, it will be necessary to make reservations immediately.

G. S. Jenkins
The Consolidated Coal Co.

A. S. Knoizen
Joy Mfg. Co.

H. C. Livingston
Union Pacific Coal Co.

D. L. McElroy
Pittsburgh Consolidation Coal Co.

E. R. Price
Inland Steel Co.

Carel Robinson
Consulting Engineer

E. F. Stevens
Pyramid Coal Co.

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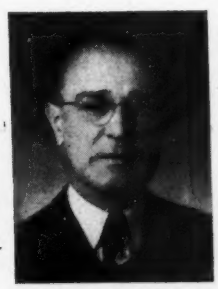
J. H. Sanford
Ohio Brass Co.



Fred O. See
Cardox Corp.

Geo. L. Smith
Rochester & Pittsburgh Coal Co.

W. H. Stewart
Central Indiana Coal Co.

G. J. Stollings
Powellton Coal Co.

John T. Sydnor
Rail & River Coal Co.

Jas. F. Trotter
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WHEELS OF GOVERNMENT

As Viewed by A. W. DICKINSON of the American Mining Congress

THE pace which Congress set in organizing has slowed down under the legislative grind of the all-important portal-to-portal and labor legislation.

The joint House and Senate Budget Committee, now required by the Congressional Reorganization Act, recommended a reduction of $6 billion in the Administration's $37.5 billion budget. Under the generalship of House leaders this figure was quickly approved but the Senate, after more than a week of debate, set the reduction at $4.5 billion, earmarking $2.6 billion of the excess of revenues over expenditures to be applied toward reduction of the public debt during fiscal year 1948. A compromise cut of $5 billion may be reported by Senate and House conferees but the earmarking for debt retirement may not survive, as House members appear anxious to apply any savings from the budget to a reduction of the income tax on individuals.

Plans of the House Committee on Ways and Means call for hearings on individual income tax reduction during March, at which time testimony will be taken from tax officials of the Treasury and from congressional joint committee tax specialists. Chairman Harold Knutson (Rep., Minn.) has stated that questions of inequities in excise taxes will also receive attention.

Both Houses have now approved the bill extending wartime excise tax rates indefinitely. The revenue involved is $1.1 billion.

Portal-to-Portal

On February 28 the House outdistanced the Senate by passing, 345 to 56, the Gwynne bill outlawing existing portal-to-portal suits and protecting employers against future retroactive interpretation of wage-hour statutes. This heavy vote of more than 6 to 1 portends insistence by the House upon its bill in the coming conference with the Senate. The Senate's Capehart-Wiley bill, as reported to the floor, is disappointing and does not afford adequate protection to industry against many liabilities that may arise under the Fair Labor Standards Act. It was recommitted to the Judiciary Committee March 3 for further study.

At the Gwynne bill hearings before the House Judiciary Subcommittee, Secretary Julian D. Conover, speaking for the mining industry, explained that the dissipation of capital assets in settling claims and suits for back pay would force abandonment of many mining operations and seriously retard development of new mineral reserves. He emphasized the injury to the mining industry involved in the suits pending and referred to the particular severity of the attendant costs of defense upon small mine operators.

Action on Labor Bills

Many weeks have now been consumed by the Labor Committees of both Senate and House in taking the testimony of industrial and labor organization witnesses on the many bills offered to curb the monopolistic practices of national unions. Chairman Taft (Rep., Ohio) of the Senate Committee on Labor and Public Welfare has announced the close of hearings March 8 and has stated that a bill will be reported to the Senate as near March 15 as possible. He is reported to have conferred with Chairman Hartley (Rep., N. J.) of the House Committee on Education and Labor regarding the scope of the bills to be reported.

Hartley has listed a number of provisions which he anticipates will be contained in the House bill. They are: (1) Make a strike illegal unless a majority of all members of the union vote for it by secret ballot; (2) outlaw the closed shop; (3) bar secondary boycotts; (4) outlaw mass picketing and violence on picket lines; (5) ban jurisdictional strikes; (6) make unions equally responsible with management for living up to contracts; (7) penalize workers who go out on wildcat strikes; (8) allow employers freedom of speech in advising their employes on labor-management problems; (9) forbid foremen to join unions; (10) require unions to file, at least with their own members, regular statements on income and expenditures.

Witnesses appearing for the mining industry before the committee were Charles R. Kuzell, assistant general manager of Phelps Dodge Corporation, Douglas, Ariz.; Howard I. Young, president, American Zinc, Lead & Smelting Co., and president of the American Mining Congress; Forney Johnston, National Coal Association; and Rolla D. Campbell, general counsel, Island Creek Coal Co.

Mr. Kuzell presented 12 recommendations, based on the Declaration of Policy adopted at the A. M. C. Denver meeting in September, and subsequently approved by the Board of Directors. Mr. Young said that the anti-trust laws should be made to apply to centralized control of bargaining by a national union organization, leading to uniform contract demands and unified strike actions. Citing numerous examples from his own experience, he explained the need of making unions and their members responsible under their contracts for their acts; opposed the closed shop;

Washington Highlights

CONGRESS: Down to steady grind.

PORTAL-TO-PORTAL: Gwynne bill approved 345 to 56.

LABOR BILL: Expected soon on Senate floor.

NLRBoard: Trims its sails.

TRADE AGREEMENTS: President speaks on "escape clauses."

STOCKPILES: Purchasing policy formed.

METAL PAYMENTS: House acts on Russell bill.

"INCH" PIPELINES: Sold.

COAL: Stalemate awaits Supreme Court decision.

asked for provision under which the striking employe loses his status as an employe if he has been replaced, or has refused an offer of reinstatement; urged exclusion of supervisory, professional, administrative and confidential employes from the coverage of the Wagner Act; and asked restoration of the employer's right of free speech to his employes.

Presenting the specific viewpoint of the coal industry, Forney Johnston called particularly for prohibition of the "collectivist tonnage tax forced on the industry by the Krug-Lewis agreement for a central union welfare fund." Rolla Campbell charged that large labor unions had converted themselves into private, irresponsible, supergovernments and that their power has been obtained under the protection of Federal laws, particularly the Clayton Act, Norris-La Guardia Act, Wagner Act, National Industrial Recovery Act; and, in the coal industry, the two Coal Acts. He then vigorously opposed the employer-financed and union - administered health and welfare fund, pointing out the vices of such a practice. As other means whereby unions seek monopoly power, Campbell pointed out the closed shop, unionization of foremen and other employer representatives, physical coercion, and the secondary boycott.

NLRBoard Stiffens Up

Recently the NLRBoard has evidenced in its decisions a more realistic attitude than in the past. Reversing a previous decision in the case of Thompson Products, Inc., at Detroit, the Board has ruled that strikers forfeit their protection under the Wagner Act when participating in an unlawful strike. A strike is considered unlawful by the Board when a union strikes to obtain recognition after the Board has certified a different union as the collective bargaining representative. In another case the Board upheld the employer in the discharge of a number of employes who struck while working under a contract which carried a "no-strike" clause.

The Board has also declared that it will refuse henceforth to interfere with bargaining relations secured by collective agreements of two years' duration. This means that when a union has a two-year contract with an employer, it will be safe for the duration of the agreement from any rival union's challenge of its right to represent the employes. Previously the Board had limited this protection to one-year contracts except in industries where longer bargaining agreements were the rule. In explaining its new policy, the Board said: "For large masses of employes collective bargaining has but recently emerged from a stage of trial and error, during which its technique and full potentiality were being slowly developed under the encouragement and protection of the Act. To have insisted in the past upon prolonged adherence to a bargaining agent, once chosen, would have been wholly incompatible with this experimental and transitional period. It was especially necessary, therefore, to lay emphasis on the right of workers to elect and change their representatives. Now, however, the emphasis can better be placed elsewhere."

Trade Agreement Compromise

As the outgrowth of conferences held over the past several months between Senators Millikin (Rep., Colo.) and Vandenberg (Rep., Mich.) and Under Secretaries of State Acheson and Clayton, the President has issued an Executive Order calling for procedural changes in the reciprocal trade agreements program. Senators Millikin, Chairman of the Finance Committee, and Vandenberg, Chairman of the Committee on Foreign Relations, have since stated that the Order differs from their suggestion that the Tariff Commission should have responsibility to prevent errors before they occur. They also state that they will reserve judgment on the proposed Geneva negotiation for a new world trade organization, until the completed agreement is submitted for congressional approval.

In brief, the President's order provides that the United States shall be free to withdraw a concession granted on any article in the course of a trade agreement in case the resulting increase in imports causes, or threatens, serious injury to domestic producers of like or similar articles. The Tariff Commission is directed to investigate and hold public hearings to determine whether concessions have developed to the point where they are causing or threatening such injury, and if so, to recommend to the President the withdrawal or modification of the concessions. Also created is an Interdepartmental Committee on Trade Agreements to advise the President with respect to the conclusion of any trade agreement. This committee includes representatives of the Tariff Commission and of the Departments of State, War, Navy, Treasury, Agriculture, Commerce and Labor. Based on Tariff Commission studies of each dutiable import item considered for inclusion in a trade agreement, the committee is directed to make recommendations to the President, but dissenting members may specify the point beyond which they consider that any reduction or concession involved cannot be made without injury to the domestic economy.

It is further required that there shall be included in each trade agreement a most-favored-nation provision securing for the exports of the United States the benefits of all tariff concessions and other tariff advantages hereafter accorded by the other party or parties to the agreement to any third country. The Interdepartmental Committee is directed to recommend withholding tariff concessions from any country discriminating against the trade of the United States.

In connection with the subject of foreign trade agreements it is of interest to note that one bill has been introduced in the House to repeal the import excise tax on copper and another to suspend the tax until March 31, 1950. In an executive session of the Committee on Ways and Means, March 5, the bill to suspend the tax until 1950 was endorsed by representatives of the Treasury Department, Office of Metals Reserve, Office of War Mobilization and Reconversion, Civilian Production Administration, Bureau of Mines, and the Tariff Commission. A number of western Representatives in Congress were present and urged that the suspension be limited to one year.

Stockpile Purchases

In an effort to afford all domestic producers an equal opportunity to submit offers for deliveries to the National Stockpile, the Strategic and Critical Materials Division of the Treasury is requesting the names and addresses of producers of strategic and critical minerals, ore and materials. U. S. Bureau of Mines' records of producers by name, address and material are available to the Division but if the producer feels that he is not fully covered in these records he may address H. C. Maull, Jr., Head, Strategic and Critical Materials Division, Bureau of Federal Supply, Treasury Department, Washington 25, D. C.

Under provisions of the Stockpiling Act of 1946, Chairman R. R. Dupree of the Army-Navy Munitions Board is setting up a series of Industry Advisory Committees to advise the Secretaries of War, Navy and Interior and other agencies "with respect to the purchase, sale, care and handling" of materials to be stockpiled. Personnel of the committees will include primary producers, processors and fabricators and it is planned to rotate membership to permit as many key industrialists as possible to participate in drafting industrial mobilization plans.

The projected program of the ANMB calls for expenditure of $140 million for purchases to July 1, 1947. The Board's report states that $360 million could be spent to good advantage during the year beginning July 1, 1947.

In mid-February, the House Mines and Mining Subcommittee conducted

(*Continued on page* 77)

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Personals

A. G. Kirkland has been appointed Assistant to Manager of Western Mines of United States Smelting, Refining and Mining Company. Mr. Kirkland was born in Toronto, Ontario, Canada, and graduated from Queens University, Kingston, Ontario, in mining and metallurgy. He has been actively connected with mining operations for the past 15 years and has been employed by Hollinger Gold Mines, Hard Rock Gold Mines, and for the past six years as manager of the Mic-Mac Mines, Ltd., which was controlled by United States Smelting, Refining and Mining Company. He was transferred to Utah as a result of the recent sale of the company's interest in Mic-Mac Mines, Ltd.

J. P. Bradin, vice president, Pennsylvania Coal and Coke Corporation, has announced the resignations of **John M. Lee** and **N. C. Ashcomb**, effective January 31. It is understood that they plan to go into business for themselves.

B. T. Poxson of Creede was elected president of the Colorado State Mining Association at the February meeting in Denver. He succeeds **Harvey L. Tedrow** of Cripple Creek.

Others elected include **Jack Abrams** of Climax, first vice president; **Merrill E. Shoup** of Colorado Springs, second vice president; **John Hamm** of Leadville, third vice president; **C. O. Withrow** of Denver, treasurer; and **Robert S. Palmer** of Denver, executive manager. Tedrow was elected chairman of the board.

Robert Y. Anderson, formerly sales representative for the Shawmut Coal & Coke Company, is now with SFA covering New York and Long Island territory.

The retirement of Dr. **Oliver Bowles**, chief of the Non-Metal Economics Division of the Bureau of Mines, after 33 years of government service, was announced early in February by Dr. R. R. Sayers, bureau director. Internationally known for his pioneer achievements in the field of nonmetallic minerals, Dr. Bowles plans to devote his time to writing, consulting work, and to his hobby of flower culture. His retirement was effective January 31.

The board of directors of Pittsburgh Consolidation Coal Company on February 17 elected two new vice presidents to direct an accelerated modernization, research and development program, a considerable part of which will be concentrated upon the development of commercial processes for converting coal into gasoline, other liquid fuels, and gas fuel of high heat value.

Dennis L. McElroy, who has been chief engineer since 1943 of the Consolidated Coal Company of West Virginia, another subsidiary of Pittsburgh Consolidation, was named vice president in charge of engineering of the parent company. He is a former director of the School of Mines of West Virginia University, his alma mater, and former chief of the coal section of the War Production Board.

D. L. McElroy

Joseph Pursglove, Jr., of Morgantown, W. Va., was made vice president in charge of a newly established research and development division. One of his first jobs will be to assemble and direct a staff of technical experts at a new experimental station at Library, Pa., headquarters of Pittsburgh Coal. Pursglove is a graduate engineer of Cornell. After leaving school he worked in Pittsburgh, Cleveland, Philadelphia, and Morgantown, W. Va., gaining practical experience in the mining of coal and in the construction of coal preparation plants.

Jos. Pursglove

At a meeting of the Old Timers' Club, Inc., held in Pittsburgh, February 3, 1947, mine scholarships were awarded to two young men at present enrolled in mining engineering departments at two universities. One scholarship was awarded to **Robert Maurer**, of Bellaire, Ohio, now at the School of Mines at West Virginia University, and the other was awarded to **Donald McCaa**, now at the School of Mineral Industries at Pennsylvania State College. Both of these young men are ex-GIs.

The Jones & Laughlin Steel Corporation announced February 13 that Admiral **Ben Moreell** has been elected chairman of its board of directors, chairman of the executive committee and president of the corporation, succeeding **H. E. Lewis**, who retired from these offices on account of his health. Mr. Lewis remains as a director and member of the executive committee.

Admiral Moreell, former Federal Coal Mines Administrator, retired from the Navy last September. He will commence the active performance of his duties with Jones & Laughlin on March 17, but will continue as president of the Turner Construction Company of New York City until June 1, and thereafter as a director.

Recently **S. H. Williston** resigned as a member of the governing board of the Oregon State Department of Geology and Mineral Industries because of the press of business which requires him to spend part of his time in the East. On January 20, Governor Snell appointed **H. E. Hendryx**, advertising manager for the Baker *Herald*, as Mr. Williston's successor on the board. The State Senate has confirmed the appointment of Mr. Hendryx.

Walter J. Tuohy, vice president of the Chesapeake and Ohio Railway Company, has announced that **G. H. Reinbrecht** has been appointed general coal traffic manager for the system. Reinbrecht joined the Chesapeake and Ohio Railway Company in 1936. Prior to that time he had been coal traffic manager for the Erie Railroad.

According to an announcement by J. E. Berg, assistant general manager of the Federal Mining & Smelting Company, **R. W. Lottridge**, of Mullan, former chief of the electrical and mechanical departments, has been advanced to the position of general superintendent for the company; **William J. Coombe, Jr.**, superintendent of the Page Mine operation since 1938, is advanced to general mine superintendent; and **Troy M. Tower** will succeed Mr. Coombe as superintendent of the Page.

H. F. Kullberg has been appointed general superintendent of the Minnesota properties of the Inter-State Iron Company, a subsidiary of Jones & Laughlin Steel Corporation, with offices at Virginia, Minn. He succeeds R. McL. Johnson, who has retired.

Mr. Kullberg started with the Inter-State Iron Company in 1931 as a shop foreman at its Hill Annex Mine and in 1936 was made master mechanic. In 1939 he was made general master mechanic of the company, which position he held until his present appointment.

Personnel changes in three of the Solid Fuels Administration's field offices were announced early in February by Deputy Administrator Dan H. Wheeler.

Thomas H. Copper, Jr., who has been assistant at Bluefield, becomes acting area distribution manager at Bluefield, W. Va., succeeding **Daniel J. Carroll**, who has gone to Tokyo as chief coal engineer with the Mineral Resources Division of the Supreme Command in the Pacific. Mr. Carroll has been in charge of the Bluefield office for three years. **Francis Y. Casey**, after serving as temporary acting manager at Pittsburgh for several weeks, has returned to Philadelphia as area distribution manager. **Allen K. Renwick** has been named acting area distribution manager at Pittsburgh.

At a special meeting of the board of directors of the American Metal Company, Ltd., held February 11, **Harold K. Hochschild** was elected chairman of the board of directors. Mr. Hochschild will continue to serve also as president of the company. **Charles E. Stott**, general manager of the company's Mexican operations, was elected a director.

Roscoe, Clarence and **Ernest Petrey** and **Damon Surgener** recently incorporated the Black Jewel Coal Company at Fields, Ky. Its location is in Harlan County.

LaMar Fleming, of Nevada City, Calif., who before the war was mining in the Philippines and who spent two years in a Jap prison, has gone to Peru to accept a position as superintendent for a gold mining company at Trujillo.

Jay Gould Coutant, well-known fuel engineer, has become associated with the Barium Steel Corporation of New York. He will supervise the fuel and factory activities of the company. More recently Coutant was associated with the Carter Coal Company.

G. A. Joslin, Los Angeles consulting engineer, who for the past three years has been chairman of the Los Angeles Chamber of Commerce mining committee, has resigned to accept a position as manager for the Towne Securities Company of New York, which operates a number of mines in central Mexico.

Ralph Winslow was recently appointed director of the public relations division of the Koppers Company, Inc., to succeed **R. H. McClintic**, who recently resigned.

Harold Reppert, former director of the Fuels Division, Office of Price Administration, rejoined the Reppert mining interest on February 1. Mr. Reppert will be in charge of sales distribution, with offices in Philadelphia. The company is now developing additional acreage and expects to start production from a new mine near Lumberport, W. Va., early this spring.

For nine years manager of the Aramayo Mining Company of Uyuni, Bolivia, **Roy Anderson** has recently been appointed instructor in geology on the faculty of the University of Idaho at Moscow, Idaho.

W. W. Davenport, Jr., formerly vice president, was elected president of the Phoenix Coal Company at a meeting in New York of the board of directors. He was succeeded as vice president by **Anne Keay Worth**. **Charles F. Wade** is treasurer and **Genevieve Wade**, secretary.

— *Obituaries* —

Dr. Otto Sussman, noted mining engineer and chairman of the board of the American Metal Company, Ltd., died at his home after a protracted illness in New York, February 3, at the age of 67. He was born in Bavaria. A graduate mining engineer, having studied at a number of universities in Germany, he received his doctorate from the University of Wuersburg.

Dr. Sussman came to the United States in 1904, when he became associated with the American Metal Company, Ltd., as a mining engineer. Ten years later he was elected a director of the company. In 1917 he became vice president; in 1929, president; and in 1934, chairman. He was particularly outstanding in mining circles for his foresight, skill, and ability in aiding the development of the Rhodesian copper fields, and the accompanying American participation.

Dr. Sussman was an executive officer of the U. S. Metals Refining Company and the Blackwell Zinc Company. He held directorships in the following corporations: Consolidated Coppermines Corporation, Cotopaxi Exploration Company, O'okiep Copper Company, Climax Molybdenum Company, American Zinc & Chemical Company, The Anglo Metal Company, Ltd., Rhodesian Selection Trust, Ltd., Roan Antelope Copper Mines, Ltd.

Warren C. Bracewell died on February 5 at Hot Springs, N. Mex. For 22 years he was state inspector of mines in New Mexico. As a youth, Mr. Bracewell began work as a coal miner in Illinois, and after the death of his father in a mine accident, he took up mine safety work, to which he devoted the greater part of his life. He held the position of New Mexico inspector of mines under five successive governors and achieved the distinction of reducing New Mexico's mine fatality record to one of the lowest in the country.

Roger H. Downer, 70, mining engineer, died February 8 at his home in Albuquerque, N. Mex., after a long illness. He was a former secretary of the New Mexico Miners and Prospectors Association, resigning in August, 1946, because of ill health. He was born at Rosita, Colo., and graduated from the Colorado School of Mines. He is survived by his widow, Mrs. Helen A. Downer.

Edwin T. Lavigne, known to mining company executives and as secretary of the Standard Stock Exchange (the mining exchange) of Spokane, Wash., died recently in that city, aged 52 years. He was head of the Edwin Lavigne Company, investment firm of Spokane. His career was intimately associated with Northwestern mining.

H. Hobart Porter, well-known mining engineer and chairman of the board of American Water Works and Electric Company, died in New York on February 9, at his home, at the age of 81. In 1894, with the late E. N. Sanderson, he founded the engineering firm of Sanderson & Porter, from which he retired a few years ago after almost 50 years of active association.

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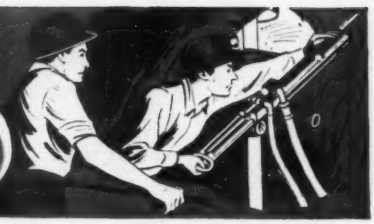
STANDARD ENGINEERS NOTEBOOK

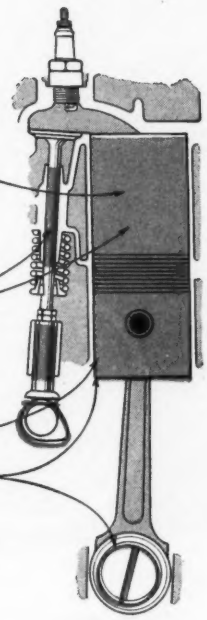


① Adhering agent in RPM Compounded Motor Oil keeps oil film on all parts after engine stops, even on cylinder walls.

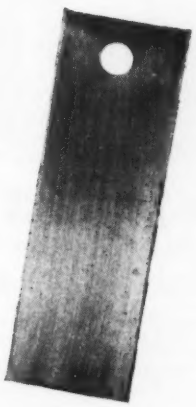
② Rustproofing compounds prevent moisture that condenses on cooling parts from contacting metal.

③ No rust is formed to scrape off when engine starts, and cause excessive wear.

④ Constant lubricant film provides adequate and instant lubrication when engine starts.



This actual photograph shows how one HIGH-QUALITY MOTOR OIL "peeled" off almost all of this test strip of steel when it was placed in corrosive-moisture conditions similar to those in a cooling engine. The oil concentrated at one spot and the unprotected surface quickly rusted.



RPM COMPOUNDED MOTOR OIL kept this strip bright and shiny, completely sealed against rusting, when it was exposed to the same conditions. "RPM" compounds keep a constant rust-proofing lubricant film on engine parts at all times, whether they are idle or moving.

How RPM Motor Oil Rust-Proofs As It Lubricates

Rusting, caused by corrosive moisture, is the greatest source of wear in automotive engines (85%, according to some engineers). It can be controlled by using RPM Compounded Motor Oil.

Additional compounding for "RPM," perfected by Standard of California scientists, provides a rust-proofing lubricant film on internal engine surfaces. The heaviest moisture condensation in idle or cold-running engines will not cut through it.

Other compounds in RPM Motor Oil give it adherent qualities so the film stays on parts at all times. They also loosen and remove gum and lacquer, lubricate hot spots, resist sludge formation, bearing corrosion and stop foaming.

Trademark "RPM" Reg. U. S. Pat. Off.

For additional information and the name of your nearest Distributor, write Standard of California, 225 Bush Street, San Francisco 20, Calif.; The California Oil Company, 30 Rockefeller Plaza, New York 20, N. Y.; The California Company, 17th and Stout Streets, Denver 1, Colo.; Standard Oil Company of Texas, El Paso, Texas.

FOR EVERY NEED A **STANDARD OF CALIFORNIA** JOB-PROVED PRODUCT

Even where footing is bad

your operator has perfect control

EVEN when the footing is precarious, the operator of the Gardner-Denver R104 self-rotating Stoper has easy control of the machine. That's because the R104 has *perfect physical balance*. Its holding handle is located well up on the cylinder—not in the usual position down in the head. Most of its weight is placed below this handle—there's no tendency for the drill to feel light on the point of the feed piston. Thus an extra factor of safety has been added to the reliability, speed and rotating power which have made the Gardner-Denver R104 a famous drill. Here are some of the other things you'll like about it:

Better operating balance—*feed pressure is balanced with the power of the drill itself. Between each blow of the hammer, the drill eases away from the rock just enough so that the rotation can turn the bit without noticeable drag.*

Water and sludge kept out—*a fully automatic system of cleaning air protects the drill completely from entrance of water and sludge.*

Exceptional drilling speed—*Mainly due to the valve design. Actuating air is admitted quickly and the valve has an extremely short stroke.*

Four pawl rotation—*Four reversible pawls with a suitable combination of ratchet ring and rifle bar assure efficient performance in all types of ground.*

Effective lubrication—*large oil reservoir located around the cylinder liner.*

For complete information, write
Gardner-Denver Company, Quincy, Illinois.

GARDNER-DENVER
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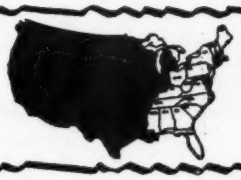
Jeffrey-Galion (Pty), Ltd.

NEWS and VIEWS

Eastern States



Anthracite Meeting Date Announced

The Fifth Annual Anthracite Conference of Lehigh University will be held at Bethlehem, Pa., May 8 and 9, 1947. Reports on technological progress being made in production, distribution and utilization of Pennsylvania anthracite will be reported at the conference. Edward H. Walker, of the Anthracite Institute, is chairman of the committee on publicity.

New Portal Equipment

The Willow Grove Mine of the Hanna Coal Company at St. Clairsville, Ohio, has opened a new portal 4 miles closer to the coal mine than the previous one. This new portal is equipped with comfort and restaurant facilities comparable to those of a modern hotel.

The portal building is on top of a 175-foot shaft and contains a 25-shower washroom; a dressing room that can be accommodated for the mine's 600 employes; drinking fountains and toilet facilities; a lounging room, and an elaborate restaurant, from which hot meals are available for the three shifts. Ultra-violet lamps are also installed that minimize the dangers of spreading airborne cold and other germs.

When the men used the former portal, they rode 4 miles to their working places. They now ride a passenger elevator for 22 seconds, walk through a concrete, electric-lighted corridor, push through what is believed to be the only revolving door in the coal mine industry, and then they are practically at the coal seam. This portal was used for the first time by 125 night shift miners on February 10. After looking it over, they went to work grinning.

Anaconda to Prospect in British Guiana

Anaconda Copper Mining Co. has applied for exclusive prospecting rights in certain portions of British Guiana's undeveloped and largely unexplored hinterland, according to A. G. King, lawyer and member of the British Guiana Legislature. Mr. King, who recently returned to Georgetown from New York, said that the company was prepared to spend "any sum within reason."

In addition to gold, this British colony is reputedly rich in other minerals and has produced a small quantity of uranium ore, the metal used in atomic fission.

Mr. King said that in New York he discussed and settled with the Anaconda Company "various agreements for options on privately controlled Crown lands and over the portion of the colony for which the company has applied to the Government for exclusive permission to prospect." Mr. King added that the Government had "favorably considered" the proposition. In New York, Anaconda officials said they expected to send engineers to British Guiana within a month or two to survey prospects.

Bureau of Mines Studies Sulfur Reduction in Pittsburgh Coal

To help maintain adequate production of coke for the blast furnaces of the Pittsburgh steel district, the Bureau of Mines has made an intensive investigation of the washing characteristics and the possibilities of reducing the sulfur content of Pittsburgh-seam coal, Dr. R. R. Sayers, Director of the Bureau, announced February 9 in releasing a technical report on the subject.

Since 1841, when coke began replacing charcoal as blast-furnace fuel, more than 700,000,000 tons of Pennsylvania Pittsburgh-bed coal have been converted to coke for the steel industry, the publication states. Although this imposing tonnage is but a small fraction of the reserves still in the ground, only about a fourth of the remaining supply can be used for metallurgical purposes under present quality limitations on sulfur, even presuming the greatest possible improvement of the coal by mechanical cleaning.

Prepared by Thomas Fraser, Bureau coal preparation engineer, and William L. Crentz, Bureau coal technologist — both with the Bureau's Coal Division, Fuels and Explosives Branch, Washington, D. C.—the 85-page technical report also includes detailed interpretative data on the test conducted. The study was one of a series on American fuels.

L. E. YOUNG
Consulting Engineer
Mine Mechanization
Mine Management
Oliver Building Pittsburgh, Pa.

Let's get down to Brass Tacks...

The I-T-E Type KSC Automatic Reclosing Circuit Breaker not only assures protection of your mine and equipment against damage resulting from electrical disturbances but, in addition—*it saves you time.*

At the first sign of danger, the breaker automatically opens, and remains open, until danger passes. Then, when line conditions return to normal, it *automatically recloses* without waste of time or slowing of production.

By sectionalizing your mine with I-T-E Automatic Reclosing Circuit Breakers, you confine faults to the section in which they occur. Other sections remain unimpaired and work can continue as usual.

Be Wise...

SECTIONALIZE

Assure time-saving protection with the I-T-E Type KSC—the circuit breaker with the automatic reclosing feature.

Avoid "down time" interfering with production. Find out how by sending, now, for new Bulletin 4611 on I-T-E Automatic Reclosing Circuit Breakers. I-T-E Circuit Breaker Company, 19th and Hamilton Streets, Philadelphia 30, Pa.

SECTIONALIZING SWITCHGEAR

Annual Supervisors' Banquet

Pond Creek Pocahontas Co. held its annual Safety Meeting at Bartley, W. Va., on February 10, with an attendance of 45 night supervisors and officials for the noon hour dinner meeting. The day supervisors, officials, and guests totaling a hundred, had their dinner meeting that evening.

A. J. Bartlett, director of safety, presided over the meetings and presented an analysis of safety performance by mines and the causes of accidents for the year 1946. These were reviewed and discussed by local officials. Seventeen foremen were congratulated for their excellent safety performance, for not having a lost-time accident in 12 months or more. Also cited were 18 foremen who had only one lost-time accident during the year. Top honors went to Mine No. 1 for producing 1,033,476 tons of coal with one fatality and 23,488 tons per lost-time accident.

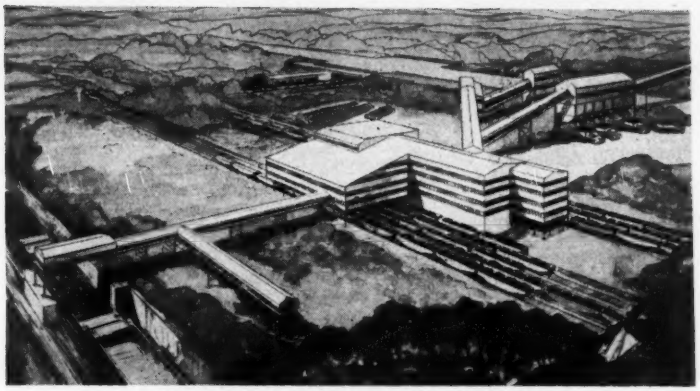
Safety Record in January

Four Island Creek section crews at Holden, W. Va., were cited for outstanding production performance for the month of January, 1947. In first place was the crew supervised by Clifford Casey at Mine No. 20, and in second place, Carl Dickenson and crew at Mine No. 15. Tying for third place honors were John Welch's crew at Mine No. 7 and Ed Dalton's crew at Mine No. 1. The variation in the performance of these four groups was only 5 per cent.

The mine rescue station of the Island Creek Coal Company at Holden is one of the newest and best-equipped rescue stations in the state. In the event of an emergency, equipment is instantly available and the safety department has concentrated upon the training of rescue crews. A physical examination is required from men who desire to take a special training course where they are instructed by the members of the safety department in the use of the latest mine rescue equipment. The course is quite long, as the individual who is being trained must know, not only the best methods of using the equipment, but also how to take care of it and how to avoid mistakes.

The company has six sets of oxygen breathing apparatus (Gibbs) which are kept ready at all times. Thirteen Burrell All-Service Masks are also available. These are for use when there is enough oxygen in the atmosphere to support life, but carbon monoxide, smoke and fumes may also be present. A telephone mask is also available with a built-in communication system whereby messages can be sent and received by a person at the fresh air base through 1,000 ft. of cable.

Jeffrey-Galion (Pty.), Ltd.



Construction to Start on New Coal Plant

Contracts for this latest post-war coal-cleaning and preparation plant, part of a $4,000,000 surface development program at the Mathies Mine, near Monongahela City, Pa., were approved recently in Pittsburgh by the board of the Pittsburgh Consolidation Coal Co.

Construction is scheduled to start as soon as possible on the structure. It will have a capacity of 7,000 tons daily, equal to the projected capacity of the mine, one of the newest and most modern in western Pennsylvania.

Coal will be dumped onto a belt system at the mouth of the mine (rear center) and transported underground to the main preparation plant. After it has been cleaned in water, whose gravity has been raised by sand, the coal can be distributed to four points by belt.

The Mathies Mine is named in honor of Sergt. Archibald Mathies, a machine gunner of Finleyville, Pa., employe of Pittsburgh Coal, who gave his life in England trying in vain to land a shell-riddled Flying Fortress and save its wounded pilot. He was awarded the Congressional Medal of Honor posthumously.

The mine has reserves sufficient to insure its operation for 40 or 50 years. When the modernization program is completed at the mine, it will represent an investment of approximately $7,000,000, or nearly $10,000 per employe.

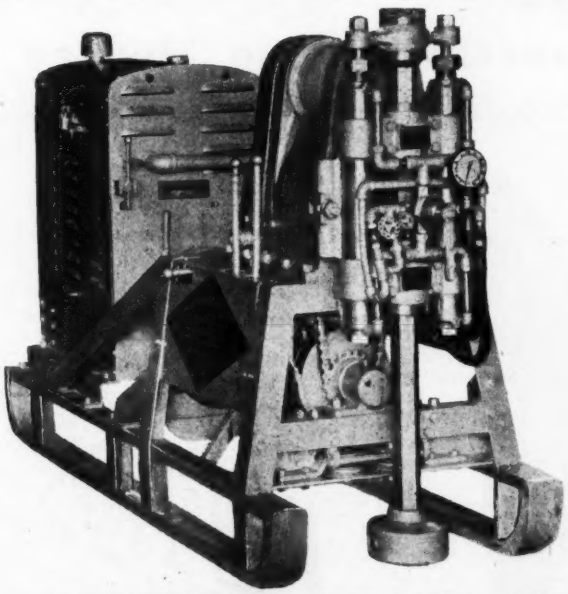
New Stripping Law Proposed

A bill was recently introduced in the House of Delegates of the Maryland Legislature which would require operators of strip coal mines to plant denuded hills and spoil piles with trees, shrubs, and grasses. Under the terms of the law operators would be required to post bonds of $300 an acre and if the land were not beautified within one year after digging operations had been halted, this bond would be lost.

New Coal Operation in West Virginia

The Truax-Traer Company is opening a new coal mine at Dorothy in Raleigh County on the Clear Fork of Coal River. The company expects to ship some coal about May 1, but the actual date of production has been delayed by difficulties in obtaining construction materials. Concrete footings are being run for the tipple and

DIAMOND CORE DRILLING



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TESTING COAL PROPERTIES OUR SPECIALTY . . . WE GUARANTEE SATISFACTORY AND PROPER CORES. . . .

TESTING ALL MINERAL PROPERTIES . . . PRE-PRESSURE GROUTING FOR MINE SHAFTS . . . GROUND SOLIDIFICATION FOR WET MINE AREAS BY OUR STOP GROUT METHOD . . . WATER WELLS AND DISCHARGE HOLES DRILLED AND GROUTED . . . ELECTRIC DRILLS FOR INSIDE MINE DRILLING.

MOTT CORE DRILLING CO.

HUNTINGTON WEST VIRGINIA

conveyors; this work should be completed shortly and actual construction will begin. The tipple and other installations are being manufactured and erected by Kanawha Manufacturing Company of Charleston. Opening of four drifts in the No. 2 gas seam and the laying of mine track will begin simultaneously with the construction. Preliminary work will be in this seam; the coal will be conveyed down the hillside by a 900-ft. rope-and-button conveyor and transferred at the bottom to a 42-in. belt which will carry the coal 700 ft. across the state highway and across Clear Fork to the bottom tipple at the foot of the opposite hill. All coal loaded here will be run-of-mine and will be shipped to Huntington, W. Va., for washing and sizing.

As soon as the four initial drifts in the No. 2 gas seam are deep enough to permit, slopes are to be driven through intervening rock strata to the Peerless seam approximately 40 ft. vertically above the No. 2 gas, and to the Powellton seam, about 20 ft. vertically below the No. 2 gas. All three seams will be worked simultaneously with a normal production of 4,000 tons per day. This tonnage is expected to be reached the latter part of this year. The entries, rooms and pillars in the three seams are to be staggered in such a way as to afford maximum support of the floor of the two top seams.

Underground Gasification Tests

At Gorgas, Ala., the underground gasification project which is being conducted jointly by the Alabama Power Company and the U. S. Bureau of Mines is reported to be proceeding favorably. It is planned to continue the present experiment until some time after the middle of March and it is hoped that valuable information will be gained by that time. To date the experiment has demonstrated that a controlled fire can be maintained underground and the resulting gases, while not particularly rich, can be tapped. Further tests are planned in the time still remaining before the fire burns out; the gases will be piped directly to a boiler and will be used to make power. As soon as the fire has burned out, it is planned to excavate the entire top of the hill where the coal deposit is located. The burned seam will then be exposed and the efficiency of the underground burning process will be determined.

The Belgian Institute of Research has appropriated large sums of money for the purpose of underground experimentation on coal gasification. Pierre Demart, a Belgian, holds 28 patents relating to the process. For some time the Russians have also been experimenting with a method which uses streams of air and gases directed along a solid coal face. The Alabama project is, however, the first attempt on any extended scale to experiment with underground gasification in the United States.

Improved Iron Ore Milling Technique

In a publication released late in February by the U. S. Bureau of Mines, improved developments of metallurgical methods for the treating of red iron ores of the Birmingham, Ala., district are reported. Prepared by Will H. Coghill, chief of the Tuscaloosa, Ala., division of the Bureau's Metallurgical Branch, and G. Dale Coe, an associate chemical engineer of the same office, the publication is designed to provide operators with the latest data on the mineral-dressing characteristics of the five main seams of the Red Mountain ores.

Because all of the Red Mountain ores are characterized by the presence of particles of sea sand cemented together by low-grade hematite, clay and limestone, they present a particularly difficult beneficiation problem.

THE INVINCIBLE TOOLSTEEL CHAIN

Contributing to Modern Progress at Robena . . .

a product of lasting durability and efficiency, whose manufacturer is backed with over seventy years of experience in producing coal mining equipment.

PROX — ON THE BANKS OF THE WABASH — SINCE 1874

FRANK PROX COMPANY
TERRE HAUTE - INDIANA.

Central States

Illinois Coal Operators Elect Officers

At the Seventeenth Annual Meeting of the Illinois Coal Operators Association, held in Chicago on January 29, the executive board elected George F. Campbell president of the association. Fred S. Wilkey was elected secretary and Thurlow G. Essington general counsel.

Successful Demonstration of Trolley Phones

Early in January there was a successful demonstration of trolley phones at the Zeigler No. 2 Mine of the Bell & Zoller Coal & Mining Co. at Zeigler, Ill. These are frequency-modulated two-way radio telephones. When in use, one complete set consists of transmitter-receiver housed in a strong steel case, a small receiver in a steel case, and a "press to talk" microphone. This is carried on the locomotive and a duplicate set operates from the dispatcher's station or any other designated place. Messages can be sent to the motorman from the bottom or vice versa while he is in transit or stopped; the receiver is always open. When either party wants to talk, he presses a small button switch on the mike while talking, but it must be released when receiving.

Only two connections are necessary on the locomotive set, one to the motor ground and the other to the live trolley wire from which he gets his power. The stationary set is connected to the rail bond and the trolley wire. If more than one locomotive is equipped with the device, a message from one source would be heard at all the receivers.

At Zeigler No. 2, messages were received and transmitted from the locomotive in transit and vice versa, in and out, for a one-way distance of 2½ miles. The voices were reported as clear and strong, both on the locomotive and at the dispatcher's station.

Iron Mines Sold

The Cleveland Cliffs Iron Company has purchased the plant and equipment of International Harvester Company's Wisconsin Steel Company ore mines on the Mesabi Range near Hibbing, Minn. International Harvester is withdrawing from the operation of iron ore mines with the disposal of the properties, effective March 1.

Along with the sale of the mining property, International Harvester is sub-leasing to Cleveland Cliffs its Agnew, Hawkins and Sargent mines, which it has operated under leaseholds for many years, according to Harry O. Bercher, general manager of the steel division of International. Henceforth, International Harvester will buy iron ore on the open market, Mr. Bercher said.

Acquisition of the additional mining properties will increase Cleveland Cliffs ore mines to six in the Mesabi region.

Withdrawal by International Harvester from the mines should not mean a loss of employment for the approximately 250 employes involved,

SAUERMAN

1-Man Excavator and Conveyor

Sauerman Drag Scraper and bulldozer work together to strip deep layer of mushy overburden from ore body.

Whatever your materials—ore, coal, boulders, sand, gravel, clay—you can move it fast and efficiently with a long range SAUERMAN machine of either cableway or scraper type—at a great saving in cost. Machine is flexible; range is easily extended. Sturdy design and construction for long, dependable service. Electric, gasoline, diesel or steam power.

SAUERMAN BROS., Inc.

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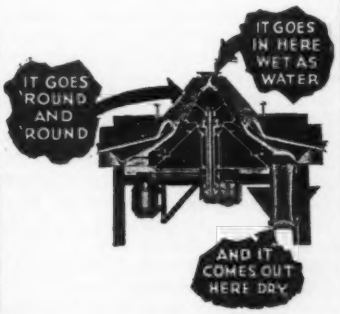
The "C·M·I" CONTINUOUS CENTRIFUGAL

The many installations of these "C-M-I" dryers in coal washing plants from Pennsylvania to Washington and Illinois to Alabama have proved that *all sizes* below ⅜ inch are delivered from "C-M-I"s with less surface moisture than can be obtained from any other type of mechanical dryer or dewaterer.

And at a cost of only a few cents per ton.



Let us tell you where these machines are in operation so that you may contact the operators and obtain from them full data on an operation similar to your own.

CENTRIFUGAL AND MECHANICAL INDUSTRIES INC.

3600 SOUTH SECOND STREET
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said Mr. Bercher, since Cleveland Cliffs will offer jobs to practically all those on the payrolls.

Mr. Bercher said pensions would be offered to all long-service employes who qualify under terms of the company's pension plan. Lump-sum payments also will be made to workers who don't so qualify, provided they have had five years' or more service.

Oil From Coal

At Louisiana, Mo., the Department of the Interior is planning to construct a demonstration plant to produce about 200 barrels of oil or gasoline daily from coal. Contracts have been let for design and construction, and orders have been placed for equipment of a type never previously fabricated in the United States. The plant is scheduled to begin operation early in 1948. This is one of several plants to be installed as part of a research program under the jurisdiction of the U. S. Bureau of Mines.

Secretary of the Interior J. A. Krug has stated that synthetic fuel production cost will be considerably lower than anticipated and Dr. R. R. Sayers, director of the Bureau, said that at the present rate of research progress, production of synthetic petroleum products on a commercial basis is possible within a few years.

Deep Shaft Nearing Completion

The sinking of two deep shafts in the Kansas section of the Tri-State zinc-lead mining field is nearing completion. One of the shafts is that being sunk by Fred J. Childress & Sons, together with Lincoln L. Smith of Joplin, on the Vanatta lease south of Melrose and bordering the Kansas-Oklahoma state line. The other is that of the MacArthur Mining Company on the Sparlin land, three miles west of Baxter Springs and immediately north of U. S. highway 166.

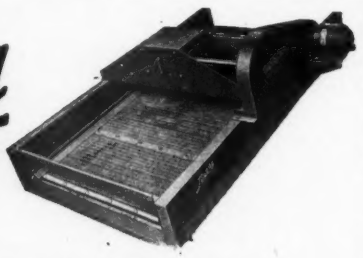
Both shafts are now in ore, the Vanatta coming in at a depth of 410 ft. and the upper run at the Sparlin being opened up at the 325-ft. level. One in the Vanatta is expected to bottom around 426 ft., but a sump will be put down to the 434-ft. level, according to Fred Childress. Little water was encountered in the sinking of the two shafts, practically none at the Vanatta although a 10-in. Pomona turbine pump with 12-in. bowles was installed in drill hole nearby. However, it is expected that the opening up of the two ore bodies, within the next 10 to 15 feet of sinking, will bring in a heavy flow of water. A 9-in. Peerless pump has been installed to handle water encountered at the Sparlin shaft.

The Vanatta shaft was put down in the midst of more than 30 churn drill holes placed on the 160-acre lease during the last two years. In 1945 the U. S. Bureau of Mines put down between eight and ten holes and the Childress interests have supervised the drilling of 23 additional holes to check the original drilling done by A. J. Wright during 1926-1929.

According to J. W. Hoffman of Joplin, general manager of the MacArthur company, an upper run of ore in the M-bed formation from the 325 to 335-ft. levels will be mined first; later the shaft will be put down to a depth of 410 ft. into the sheet ground. He said the ore being mined now in opening the new shaft looks pretty good, "mostly zinc, with a rather notable sprinkling of lead."

The Sparlan lease, comprising a quarter-section of land, is situated across the highway from the company's two original mines on the Embry 160-acre tract to the south. Extensive drilling was done on the tract during the last few years prior to the new development. When the mine

THE Leahy HEAVY DUTY



Faster, More Efficient Screening

To appreciate Leahy efficiency, you need only watch one in operation.

You see the ease with which the differential vibration speeds material over the free-swinging jacket—how all parts of the screen cloth are working—how the screen operates for long, continuous periods of time without blinding—how effortless the operation—how thorough the screening.

Yes, all Leahy parts work together in utter simplicity. Operation is in the 90% efficiency range with 97% not uncommon.

Whatever your screening job, Leahy does it quickly, thoroughly and with utmost economy. Write for Bulletin 14H.

CONCENCO FEED DISTRIBUTORS

The Concenco Revolving Feed Distributor is a heavily fabricated all steel machine, built in various types, with motor drive requiring less than ¾ H.P. in operation. This distributor effects perfectly a splitting of feed sluiced to its revolving tank, into any desired number of equal portions. It is especially suitable for efficiently feeding a battery of our SuperDuty Diagonal-Deck concentrating tables, giving an equal distribution of feed to each table.

Several types of Concenco Feeders for screens are also available.

THE DEISTER CONCENTRATOR COMPANY
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CONCENCO PRODUCTS

★ The ORIGINAL Deister Company ★ Inc. 1906

Jeffrey-Galion (Pty), Ltd.

is opened up, ore will probably be shipped (as is the case in the two presently mined operations of the company), to the No. 3 mill of the Beck Mining Company in the southwest part of Baxter Springs.

New Conveyor Installation on Mesabi Range

Two new conveyor belt systems are being installed by Pickands, Mather & Co. on the Mesabi Iron Range. At the Embarass Mine near Biwabik, Minn., a 40 x 60-in. jaw crusher is being installed with associated feeder equipment and screen from the present location on the surface to a new location in the pit. The conveyor will be in three stages and 36 in. in width. It will be used to elevate the crushed ore to the present shipping pocket on the surface. The total length between centers of the three stages of conveyor is 1,643 ft. and the net lift is 354 ft.

At the Scranton Mine a similar installation is under way. A 30 x 42-in. jaw crusher with feeder and screen equipment will feed ore to a 30-in. conveyor belt in one length of 1,600 ft. Crushed ore will be elevated 350 ft. to a shipping pocket on the surface. Crude ore will be hauled to the crushing plant in the pit by trucks. The installation will be completed some time during the 1947 shipping season.

Zinc Institute Announces Meeting

The American Zinc Institute will hold its twenty-ninth annual meeting at the Hotel Statler, in St. Louis, Mo., on Monday and Tuesday, April 28-29, 1947. The attendance at St. Louis is expected to break all records. A yearly feature in normal times, the meeting has not been held since 1944 due to restrictions on conventions.

Heat Packing and Iron Ore

G. A. Eastwood, newly elected chairman of the Board of Directors of Armour & Co., indicated recently at a meeting of the Board that current developments in amine chemistry might influence iron mining. Eastwood told of the use of amines, developed on a low-cost basis by Armour chemists in recovering potash and phosphate from low-grade deposits.

Eastwood stated that the recovery process works something like this: "The amines have an affinity for the impurities in the ores. They seek out and attach themselves to the impurities and cause them to float to the surface where they can be skimmed off. The potash and phosphate sink to the bottom and remain there when the water is removed. A somewhat similar method may possibly solve the growing problem incident to the production of iron. The end of the high-grade deposits of iron ore is said to be in sight. Future production of iron and steel may depend on the use of amines as flotation agents to separate the iron from the impurities with which it is found in low-grade deposits. The amines which we make available are the basis of some of the research being done in other quarters on this problem."

This compound is one of a whole group of fatty acids which were at one time regarded as chemical curiosities. Armour scientists have reduced the cost of the chemicals to a point where they are available for industrial use.

Lignite Production Remains High

The North Dakota lignite coal industry in 1946 mined at a maximum rate and for the year produced 2,610,544 tons of lignite coal. The record year of production was in 1943, when 2,694,600 tons were produced from the state. Most of the lignite mines of the State of North Dakota are located west of Bismarck, with Mercer County the largest producer, followed by Ward County.

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MECHANICAL FEED
HORIZONTAL DRILL
WITH TRACTION DRIVE

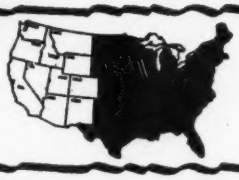
Ten years of field test has proven that our power-feed design of direct, transmission and worm gearing with two-speed control will not only cut shot hole drilling time in half but also eliminates costly maintenance delays. V-belt drive to the power-feed with an additional ample clutch in that assembly gives absolute control of a drilling speed of two to three feet per minute with a retrieving speed of twenty-four feet per minute.

The Parmanco Horizontal is adapted to all forms of high-wall drilling, will handle a six-inch auger up to a distance of sixty feet or more and, by use of our patented augers with interrupted flights and secondary cutters, will drill an absolutely clean hole with a minimum of torque. It permits the drilling of a controlled-angle hole which makes possible a great saving of explosives through the cantilever effect of this controlled-angle drilled hole.

EFFICIENT STRIPPING STARTS
WITH EFFICIENT DRILLING

PARIS MANUFACTURING COMPANY
PARIS, ILLINOIS

Western States



Rocky Mountain Coal Mining Institute Meeting

From May 26 to 28 the Rocky Mountain Coal Mining Institute will hold its annual meeting at Salt Lake City. B. P. Manley, who is executive secretary of the Utah Coal Operators Association, is chairman of the program committee. The president of the Institute is Paul L. Shields, vice president and general manager of the United States Fuel Co. The Institute is composed of operators and affiliates from Colorado, New Mexico, Utah, and Wyoming. Fred W. Whiteside, of Denver, is secretary and treasurer.

New 100-Ton Mill in Operation

At the Cleveland Mine, in Stevens County, Wash., Base Metals, Inc., is operating a new 100-ton mill on a two-shift basis. Concentrates are shipped to the Sullivan zinc plant in Idaho. C. L. Miles is general manager.

Association Urges Legislature to Encourage Mining

The Mining Association of Montana has urged the Montana Legislature to encourage prospectors and small miners in their work and to support adequately the State Bureau of Mines and Geology, which "has been doing splendid field work, visiting the various mining districts, advising and assisting prospectors in their work."

This resolution was passed at the seventh biennial meeting of the Mining Association of Montana at its business session January 23 at the Placer Hotel, in Helena.

"It is the duty of the mining industry to see that new mines are found and adequate ore reserves maintained," W. R. Allen, of Wise Rise, stated in recommending adoption of the resolutions.

"Otherwise mining will become decadent, the market for farm and range products decline, and the taxes derived by the state from this source will be lost. It is therefore of utmost importance . . . that the prospector and small miner are assisted in their work."

Allen pointed out that the mining industry contributed to the state between $2,375,000 and $3,000,000 annually in direct taxes with many more millions of indirect taxes. He cited how the development of mines had made possible the transportation facilities and industrial structure which creates an interdependency between mines and agriculture.

New Silver Producer on 1947 List

The Anglo Saxon Mine in Georgetown will be added to the list of producers in Colorado during 1947. This company has been drifting on ore for over 130 ft. and has 600 ft. of "backs" over the drift. The ore streak is said to have averaged 2 to 5 ft. in width with assays in silver running upwards to 191 ozs. per ton.

Three miles of road are being constructed to the property. Upon completion of this road and the building of ore bins, the company will be ready to start stoping and shipments should commence shortly.

The officials of the company believe they have tapped at depth the same ore shoot which in the early days produced $150,000 within a depth of not more than 100 ft. below surface. The first ore was taken from the steep slopes of Saxon Mountain at an elevation of 10,300 ft. This top 100 ft. produced some of the richest silver ore mined in the state and during its early mining activity it has been claimed that shipments averaged 1,000 ozs. of silver per ton.

Climax to Take Advantage of Winter Sports

C. J. Abrams, general superintendent of the Climax Molybdenum Co., announced recently that plans had been drawn up for a ski lift to be installed on Chalk Mountain, not far from the Climax operation. The tow will be either a chair lift or an inverted T-bar type about 4,000 ft. long. Surveying for a desirable route on Chalk Mountain has already begun and construction of the tow will start in the early spring if materials are available. The allotment granted by the Climax Molybdenum Co. for the tow is part of an appropriation being devoted to a recreational program at Climax. Because of the unusual snow conditions favorable for skiing in the Climax area, the course should attract winter sports enthusiasts from throughout the State of Colorado as well as other parts of the country.

New Equipment Added

Burro Chief Mines, near Tyrone, N. Mex., have added new machinery to the jig plant in anticipation of increased demand for fluorspar. H. E. McCray, general manager of Burro Chief Mines, reports that increased development work is being done on the 400-ft. level in anticipation of greater production from the operation.

Houston-Thomas Mine Explored

Diamond drilling work has been started at the Houston-Thomas property, located on the west slope of the Pino Altos Range, 8 miles northeast of Silver City, N. Mex. The mine is owned and operated by Andrew B. Stewart, of Silver City, and the values are in lead and silver. The property has been idle since 1943, when it was worked under lease. Shipments of ore were made to the milling unit of the American Smelting & Refining Co., at Hanover.

New Electric Line Projected

According to a recent dispatch from Salt Lake City, Utah, Kennecott Copper Corporation officials have announced that $4,000,000 will be invested in a new 14-mile heavy electrified rail line from new yards at the entrance to the Bingham Canyon open-pit mine to the Magna and Arthur smelters, where ore stockpile facilities are being enlarged.

The new line, following the foothills, will be centrally controlled and laid with 131-lb. rail. A new power transmission line will cost $225,000.

Interesting Ruling on Tax Delinquent Mining Claims

An interesting land title ruling was made recently by R. V. Bottomly, state attorney general, at Helena, Mont., for J. M. Watts, attorney of Musselshell County. The county had taken title to a tax-delinquent mining claim, including surface and underground rights, and had sold the surface rights to a purchaser. The latter claimed that the mineral rights went with his purchase and that the county had no right to divide the property.

The attorney general ruled that the county had the right to divide such land as it chose after the advertised sale date. Bottomly explained that under state statutes one party—a rancher, for instance—could buy surface rights to that type of land and another could purchase the mineral rights with the latter having a lawful right to mine or drill under the surface owned by the rancher.

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Airbase Release Requested

Owners of mining claims in what is known as the Tonopah airbase and bombing field are making an effort to obtain permission to resume prospecting and operation of their mining properties. The bombing field controls about 20 per cent of the area of Nevada and any mining or agricultural work in that region has been "dead" for some years. Now, however, the airbase has been abandoned but the area has not been reopened to mining despite reports that some claim owners have reported gold finds in recent months.

Stockmen are as much concerned as mining men and efforts are being made to obtain permission to graze stock, prospect, and develop mining properties until there is a necessity for the area to be used again as a bombing range.

Shaft Passes 1,500-Ft. Point

Reports from the once-famous silver-lead camp at Eureka, Nev., indicate that the four-compartment "Fad" shaft on Ruby Hill has passed the 1,500-ft. point. This is the most ambitious deep development project undertaken in Nevada since early Comstock activities. The shaft is designed to reach a depth of from 2,500 to 2,700 ft. and is being sunk by the Eureka Corporation, Ltd., wholly owned subsidiary of Ventures, Ltd., of Toronto.

Additional Claims Acquired

L. R. Hanley, president and manager of Hecla Mining Co., announces that Hecla has taken over 131 mining claims, approximately 2,620 acres, in a mineral belt located south of the mining camps of Wallace and Mullan, Idaho, in the Coeur d'Alene mining district.

Hecla's operating base will be from Rock Creek, just east of the Golconda custom mill. The Hecla company management has not yet decided on a final and complete prospecting plan but it is expected that a 200-ft. shaft will be sunk on one group of claims known as the Gem State. The first move to be made in the spring will be to strip with a bulldozer all known vein surfaces. Later the company may determine on a deep prospecting plan through shaft development.

Hecla's new prospecting venture is located on what is considered by geologists to be the eastern extension of the silver belt, known to contain large, deep-seated ore bodies through developments on the 3,700-ft. level in the Sunshine Mine, several miles further west.

Sunshine, Polaris, Silver Syndicate, Silver Dollar, Metropolitan, and Sunshine Consolidated Mining Cos. are already profiting from this development, extending from Kellogg east to the Montana state line and beyond, a distance of over 14 miles. In this area, five deep shafts have been put down, Sunshine to the 3,700 level; Silver Dollar, 2,400; Polaris, 3,000; Coeur d'Alene Mines, 2,800; and Atlas, 800. Sunshine has opened rich ore bodies in Polaris, Silver Dollar, Silver Syndicate, Metropolitan, and Sunshine Consolidated. The independent shaft developments of Polaris and Silver Dollar have not yet obtained their objectives; Coeur d'Alene Mines has rich ore bodies on the 2,000 level, but have not reached objectives on the 2,800; Vulcan Mining Co. is being financed by the AS&R and has started shaft work in Lake Gulch, just west of Wallace, which will go down to the 3,000 level; Hecla's Rock Creek development will be 4 miles east of Lake Gulch, and the Atlas development, which is now down 800 ft., is about 3 or 4 miles east of Rock Creek. The Atlas holdings extend on through to the Montana state line.

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Hydraulic Mining Active in California Area

Two hydraulic giants are now in action at the Hobo Gulch property of California Keystone Placer Mining Co., 15 miles above Helena. A bulldozer removes large rocks from the operating pit after top material is piped through sluiceboxes, thus permitting effective washing of gravel along bedrock. Water is pumped into the main pipeline from the north fork of Trinity River. The Hobo Gulch property contains approximately 5,000 acres.

Lead-Zinc Ore Now Being Shipped

Elayer & Richmond are shipping about 1,500 tons of lead-zinc ore a month from their Lynchburg property in the Magdalena Kelly district of Socorro County to the Empire Zinc Co. mill at Hanover, N. Mex. Twenty-two men are employed at this operation, which is equipped with a storage-battery locomotive, mucking machines and slushers.

Cordero Takes Over Horse Heaven Mercury Mines

Horse Heaven Mines, Inc., recently assigned all of its mining property in Jefferson County, Ore., to Cordero Mining Co. of Nevada. There will be no change in ownership or operating personnel since both companies have the same stockholders.

Continued Activity in Oregon Dredging

W. E. Pantle Gold Dredging Co. is now operating in ground located about one mile east of Jacksonville, in Jackson County. Equipment consists of a 1½-cu.-yd. Bucyrus-Erie dragline and a Judsen-Pacific dry-land washing plant mounted on caterpillar treads. Gold is recovered in Ainlay bowls. Overburden is stripped and overcast will be returned to the leveled-off tailings as a resoiling operation.

Tunnel Half Completed

Considerable headway is being made driving a tunnel at the old Stokes Mine at Berlin, Nev. The tunnel is now in 200 ft. and another 200 ft. must be completed to fulfill the contract. It is the belief of an engineer for the J. G. Phelps Stokes interests that rich ore may be cut near the 400-ft. point. The mine was a gold producer many years ago, but ceased operations upon reaching its boundary line. It is now in a position to cross this boundary, having purchased the adjoining claims.

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Development Continues on Gold Property

Red Wing Mining & Milling Co. has been continuing the development of its property in the Rademacher mining district, near Randsburg, Calif.

The property was originally located in December, 1929, by Mr. Risley, president and general manager of the company. During the period prior to the war, confidence in the possibilities of the property was gained by shipments to the Hughes Lake mill totaling approximately 100 tons, with returns averaging $25 a ton. The property is located 20 miles northeast of Randsburg, 6 miles due south from Ridgecrest, and 3 miles east of the old Rademacher siding.

New Exploration Company Organized

The Cascade Exploration Co., Inc., has recently been formed and incorporated at Holden, Wash. The purpose of the new corporation is to develop, mine, and deal generally in placers as well as lode properties. R. Richardson, of Holden, Wash., is named as incorporator of this mining enterprise.

New Copper Shipment

Copper ore is now being shipped from the Carlota mine located two miles west of Miami, Ariz. The property is controlled by the Carlota Copper Co. with John L. Alexander of Miami as general manager.

Steady Tungsten Production

The Conger mine, in the Boulder, Colo., district, which has been leased by Guy H. Tanner and Joe M. Smith from the Vanadium Corporation of America, is continuing to produce a good grade of tungsten ore. The Quay mill which was also purchased by Tanner & Smith, is operating on the lower grades of ore. During this last year the Conger mine was the largest tungsten producer in the district.

Gold Property to Get New Mill

The Brush Creek gold property near Goodyear's Bar on the Yuba River in California is planning the installation of a new ball mill plant capable of treating 80 to 100 tons of ore daily. This new mill will replace the small unit now in use. Alfred L. Merritt of Piedmont is operating the property and development work carried on from the main tunnel is said to have disclosed a substantial reserve of milling ore.

Wheels of Government

(*Continued from page* 62)

hearings on the purchasing procedure of the Treasury and the ANMB under the Stockpiling Act. Questioning of witnesses by Rep. Clair Engle (Dem., Calif.) and other members of the committee was directed particularly to purchasing policy under the "Buy American" provision of the Act. The hearings were recessed until the program for securing materials for the stockpile is further developed. Witnesses examined and those presenting testimony were: Harold Stein, OWMR, on general policy under the Act; Gen. S. P. Spaulding, Deputy Executive Chairman, ANMB, on operating policy; H. C. Maull, Jr., Director, Strategic Materials Procurement, Treasury, on procurement policy; Elmer Pehrson, acting for the Department of the Interior with ANMB; Morgan G. Huntington, United Mining and Milling Corporation, producer of manganese ore in New Mexico; John Church, former War Production Board engineer, concerned with nonferrous metals; and J. Carson Adkerson, American Manganese Producers Association.

Development and Conservation Payments

Bills introduced by Rep. Allen (Rep., Ill.), Russell (Rep., Nev.), Hill (Rep., Colo.) and others, which would create a National Minerals Resources Division in the Department of the Interior, are under consideration in the Mines and Mining Subcommittee of the House Public Lands Committee. These measures, discussed in our February issue, provide that the proposed Division take over the Premium Price Plan and administer a system of "development and conservation payments." It is now understood that the sponsors of these measures have reached agreement that Rep. Russell shall introduce a bill carrying the provisions of the Allen measure, with the income tax exemption deleted, for consideration of the Mines and Mining Subcommittee at an early date.

"Inch" Pipelines Sold

On February 14 the War Assets Administration sold the "Big" and "Little Inch" pipelines to the Texas Eastern Transmission Corporation of Houston, Tex., for $143,127,000. The sale was on a cash basis and the lines must be paid for in full within nine months after date of the formal letter of intent which WAA Chief Robert Littlejohn has issued accepting the proposal. As the lines are to be used for the transmission of natural gas, the purchaser must still obtain a certificate of public convenience and necessity from the Federal Power Commission. Senator Francis Myers (Dem., Pa.) has demanded a thorough investigation by the Federal Power Commission of the circumstances involved in the sale and proposed use of the lines for the transmission of natural gas into the natural market areas of anthracite and bituminous coal.

Coal Situation

Responding to an inquiry addressed to Interior Secretary Krug by Senator Capehart (Rep., Ind.), Federal Coal Mines Administrator Collisson has just stated that there is no immediate prospect of returning bituminous mines to their owners. Collisson stated that according to his best information the causes for the unwillingness of the miners and operators to enter into contract negotiations are: The desire for a decision in the case pending in the Supreme Court; the lack of a representative national negotiating organization on the part of the operators; the divergent interests and attitude of the operators, and the uncertainty with respect to labor legislation pending before the Congress. An exchange of letters between Senator Capehart and UMWA John L. Lewis has elicited no constructive information.

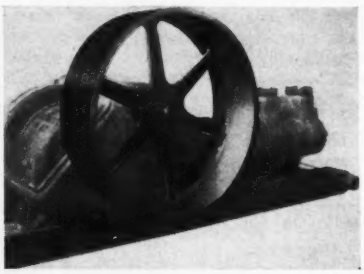
Addressing the Senate March 3, Capehart stated: "I do not rise today to uphold Mr. Lewis' position, the Government's position, or the position of the mine operators. I do rise to point out to the Senate and to the people of America the situation which actually exists today, and to say that so far as I am able to learn, no effort is being made—or at least no progress is being made—in respect to returning private property which is now technically in the hands of our Government. To me the situation is serious and dangerous.

"The able Chairman of the Committee on Interstate and Foreign Commerce has told me that he feels that the Government, the mine operators and the miners' union should be called before the Committee on Interstate and Foreign Commerce to give testimony on the exact status of the situation which exists. I understand that no legislation is necessary; but I call the attention of the Senate to the situation so that Senators may know that I am hopeful that the able Chairman of the Committee on Interstate and Foreign Commerce will call the various interests together in order that we may get the answer as to what Congress and the American people may expect in the future."

MANUFACTURERS FORUM

New Worthington QD Sheave Lines

Two new lines of QD sheaves, featuring improved groove-belt fit and reinforced arm construction, have been announced by Worthington Pump and Machinery Corporation, Harrison, N. J. Designated as the A and B lines, each will feature indi-



vidual groove size to match belt size—thus an A groove for an A belt, a B groove for B belt. Former A-B combinations have been discontinued.

Like the "I" beam construction of a bridge girder, the reinforced arm construction of the new Worthington QD driven sheave incorporates a longitudinally ribbed arm recessed down the middle. Advantage of this type of arm is that material is removed at or near the neutral axis where it adds little or no strength to the arm. This material is then added at the points most remote from the neutral axis where it gives the greatest strength.

New Quicklag Circuit Breaker

The new Westinghouse Quicklag circuit breakers provide several new refinements, chief of which is a new tripping action which combines the inverse time limit characteristics of Bimetal thermal action on overloads with the operating speed of magnetic trip action on short circuits.

Available in single or double pole, 10 to 50 amperes, 125 to 125/250 volts a-c, the new breaker provides another improvement, a redesigned "De-ion" arc chute that eliminates the need for a vent screen in the bottom, thereby permitting mounting flush to pan. This eliminates need for the ⅜-in. mounting clearance formerly required.

Other improvements include: A sturdier operating handle more enclosed than the old; internal design requires less handle movement; hole in handle permits more satisfactory method of attaching handle extension for two-pole operation; and smooth flush surface to eliminate dust traps.

Of importance to circuit breaker users is the fact that the new Quicklag will not require retooling or redesigning existing fabricating facilities as the over-all and mounting dimensions are the same as for the older Quicklag.

Further information on these welders may be secured from the Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

Improved Clear-Vue Dustfoe Respirator

The M.S.A. Clear-Vue Dustfoe respirator, combining improved wearing comfort and better appearance with complete breathing protection—U. S. Bureau of Mines approved—

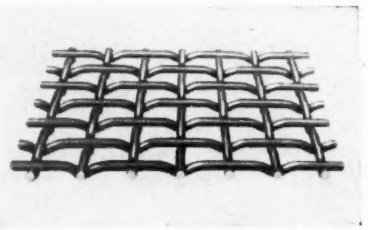
against every type of nuisance or harmful dust encountered in industry, is offered by Mine Safety Appliances Company, Pittsburgh, Pa.

This respirator has a facepiece of formable aluminum which insures a comfortable fit on any face. A soft, flexible face cushion provides a dust-tight seal. The filter container is made of tough, transparent plastic, permitting visual check of filter position, type, and condition. The economical, single, throw-away-type filters are colored to facilitate instant recognition. The green Type AC filter has an especially low breathing resistance and is recommended for pneumoconlosis-producing and nuisance dusts and mists, and for heavy, fast-clogging dust concentrations. The All-Dust Type is red, providing maximum filtering efficiency against all dusts, and is recommended for protection against such toxic dusts as lead, cadmium, manganese, etc.

Bulletin No. CM-7, which contains complete details, may be obtained by writing direct to Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.

"Roe Flat" New Roebling Screen

Roebling's Roe-Flat aggregate wire screen is the first in a number of new products being developed in Roebling's enlarged and newly equipped



woven wire fabrics division. New and unique methods have been developed for crimping, for bending edges, and welding. These developments now make it possible to produce aggregate wire screens with true precision openings—a feature in heavy screen manufacture which, it is said, has heretofore been difficult to obtain.

Roe-Flat is one of the new Roebling screens. It is designed to provide maximum metal surface exposed to abrasive wear usually encountered where this type of screen is used. Its flat surface evenly distributes wear, increasing screen life up to 90 per cent above conventional type screens.

In operation, it is claimed, the flat surface permits an even, smooth flow across the screening surface, tending to eliminate the clogging or blinding often found with the use of screens made with surface crimps or knuckles. In addition, Roe-Flat has proven to be the ideal supporting surface for fine-mesh screen. Its smooth top practically eliminates the spreading of wires and breaks usually caused by backing screens with uneven surfaces. Full information upon request to the John A. Roebling's Sons Co., Trenton 2, N. J.

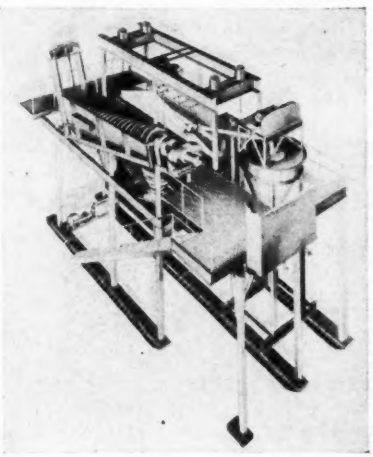
Jeffrey-Galion [Pty.] Ltd.

"Mobil-Mill"

"Mobil-Mill," a new plant design, employing the heavy media separation process, has been announced by the Western-Knapp Engineering Co., Division of the Western Machinery Co., 760 Folsom Street, San Francisco.

The purpose of this new design is to incorporate the HMS. process, along with complete media recovery facilities, into a prefabricated unit. The design is unusual in that an entire concentration or separation mill may be obtained in packages, containing all structural elements, that merely require field bolting assembly to put the mill into operation.

Structually, the "Mobil-Mill" employs heavy steel beam sections, curved on the end, to be used as a skid base. Heavy structural angle irons and channels make up the main columns and beams. The main members are then tied together by orthodox methods employing lighter angle irons, tie rods and web plates. Flooring and stair treads are fabricated from welded steel grating. Standard pipe stocks serve as a source for hand and safety rails. Piping and wiring are carried beneath the sectionalized flooring, wherever feasible, to allow the operator a maximum freedom of movement.



The design follows standard HMS. practice in the choice of the machines installed.

The "Mobil-Mill" is being offered currently in two sizes. The unit employing the 5-ft. diameter separatory cone will treat from 5 to 15 tons of feed per hour; the 7-ft. cone size will treat from 15 to 25 tons of feed per hour. The capacities will be dependent upon the nature and type of material being treated.

The unit is available on a straight sale basis, or through a rental arrangement, when the field operator is not justified in making a capital investment.

— *Announcements* —

Appointment of **M. V. Cornell**, of Marion, as sales manager of **Marion Power Shovel Co.** has been announced by John P. Courtright, vice president in charge of sales and service.

Mr. Cornell has been associated with the company since 1938, in charge of sales in eastern Ohio and western New York State. Mr. Cornell's association with the company was interrupted by three years of military service. During most of that period he served as a lieutenant, senior grade, attached to ships of the Seventh Fleet.

As sales manager, he heads a Marion Power Shovel Co. sales organization made up of company representatives, district offices and distributors throughout this country and in a number of foreign countries.

* * *

Kennametal Inc., Latrobe, Pa., manufacturer of cemented carbide tools, announces the opening of an office at 528 White Building, Buffalo, N. Y. **Harry W. Bearfoot** has been transferred from Pittsburgh to Buffalo where he will serve as tool engineer and representative.

* * *

The **Electric Storage Battery Co.** announces the appointment of **Kenneth W. Green** as purchasing agent to succeed William B. Gold, who died recently. Mr. Green had occupied the position of assistant purchasing agent since August, 1946. He has been associated with the company since 1927.

* * *

Richard W. Parsons recently was named technical director of the Mansfield factory of **The Ohio Brass Company.** Mr. Parsons, a graduate in metallurgy from Ohio State, has been in the Engineering Department of Ohio Brass for 20 years.

He was named assistant metallurgist in 1929, and plant metallurgist in 1931. He held this position until 1942, when he became chief metallurgical engineer, the position he held until his present appointment.

* * *

John G. Copeland, Jr., has been appointed assistant superintendent of the Hercules, Calif., dynamite and ammonia plant of **Hercules Powder Co.**, the company announced recently.

For the past eight months he has been assistant manager of the Hercules-operated Missouri Ordnance Works, Louisiana, Mo., which produces ammonia for the Government.

Mr. Copeland joined Hercules in 1936 after graduating from North Carolina State College.

W. W. Paape, district representative in the Chicago territory, has been promoted to the position of domestic sales manager of the **Euclid Road Machinery Co.** He will take over his new duties on March 28 at the main offices of the company in Cleveland, Ohio.

A graduate of the University of Illinois, Mr. Paape has been active in the construction industry for over 20 years. Prior to his Euclid connection, he was sales manager of Syracuse Supply Co., and before that time served as representative for Caterpillar Tractor Co. and LaPlant Choate Mfg. Co.

E. F. Armington, former sales manager, will devote the major portion of his time to executive and management duties as secretary of the company.

* * *

Announcement is made by **American Car & Foundry Co.** of the following new appointments: **F. H. Eaton**, formerly sales engineer, is appointed assistant to vice president, and **H. J. Russell**, previously sales agent, has been named assistant to vice president. Both will continue to make their headquarters in New York.

* * *

Promotions of two officials of the **Cummins Engine Co., Inc.**, Columbus, Ind., have been announced by Hugh Th. Miller, chairman of the company's board of directors. The changes were effective January 1, 1947.

V. E. McMullen is now executive vice president of the company, and **R. E. Huthsteiner** is vice president and general manager.

Mr. McMullen, who has been serving as vice president and general manager, joined the Cummins Engine Co., Inc., in 1935 as factory manager, after wide experience in the industrial field.

Prior to his promotion, Mr. Huthsteiner was vice president, assistant general manager and controller. He joined the Cummins organization as sales manager in 1942 after many years in the sales field both in the United States and foreign countries.

The management simultaneously announced the appointments of **Leonard W. Beck** as general sales manager and **Waldo M. Harrison** as controller, both effective January 1.

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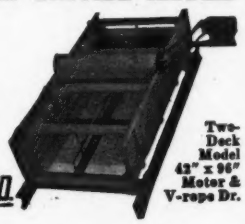
Two-Deck Model 42" x 96" Motor & V-rope Dr.

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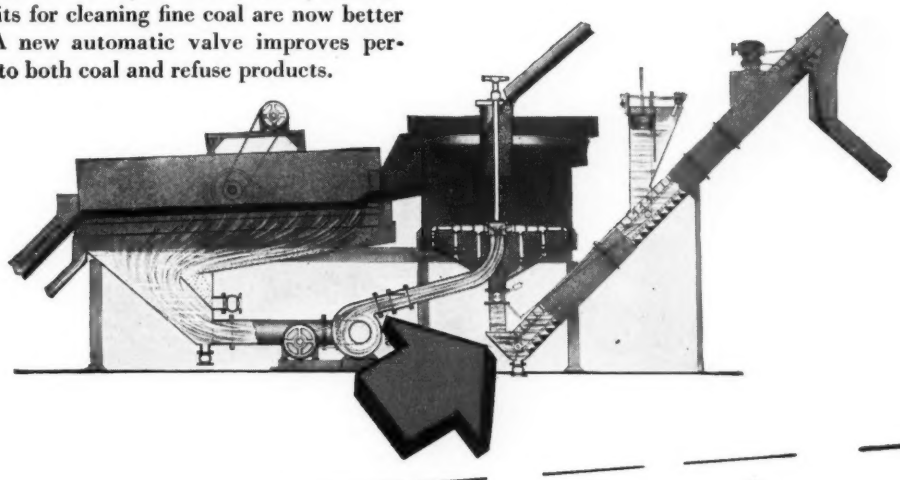
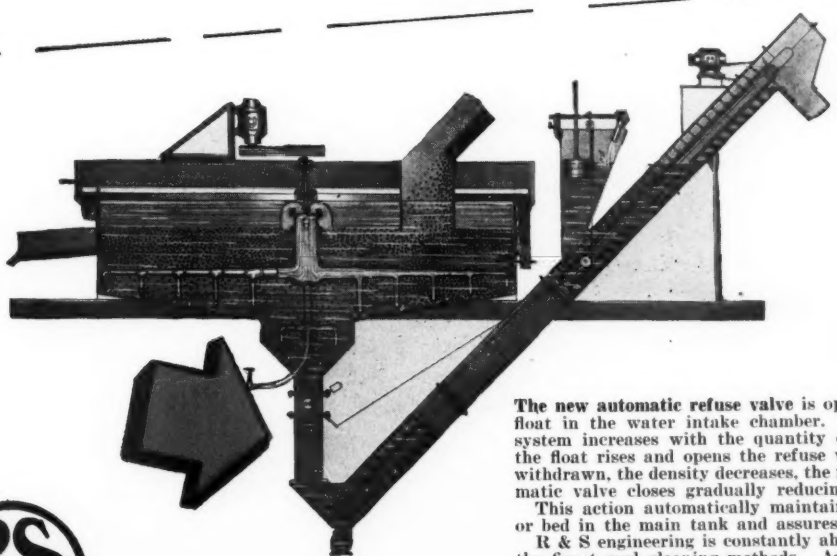
R&S HYDROTATOR and CLASSIFIER UNIT

with automatic refuse valve

The popular R & S Hydrotator and Hydrotator Classifier units for cleaning fine coal are now better than ever. A new automatic valve improves performance as to both coal and refuse products.





The new automatic refuse valve is operated by cable from a float in the water intake chamber. As the density of the system increases with the quantity of refuse in suspension the float rises and opens the refuse valve. As the refuse is withdrawn, the density decreases, the float drops and the automatic valve closes gradually reducing the refuse discharge.

This action automatically maintains a constant "bottom" or bed in the main tank and assures peak performance.

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